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Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

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Maximum PC ISSN: 1522-4279

Welcome to the New Maximum PC!

Whew! It's been a long few months, but I'd like to introduce everyone to the new, redesigned *Maximum PC*! It seems like just yesterday that I was telling you about the last *Maximum PC* redesign, but it's actually been nearly three years. A lot has changed in that period, and it's important that *Maximum PC* change with the times. Wait! Before you start writing angry letters, you should know that we haven't changed the *Maximum PC* content you know and love, not one iota. We've just given the old girl a fresh coat of paint. I wouldn't dream of changing an editorial formula that's been so successful for almost 10 years.

What have we done to your magazine? The first thing you'll probably notice is our brand-new section, The List. I've been a big fan of lists ever since I first saw *Late Night with David Letterman*. After consulting our attorneys, I discovered that there was absolutely no reason we couldn't have a similar section in *Maximum PC*, and thus was born The List. Seriously though, we've got a killer umm... list of lists lined up, so make sure you check out the section every month. You'll either laugh or cry, I promise.

I also want to introduce our new columnist. Joining Tom Halfhill and Thomas McDonald is Quinn Norton, who's very excited to talk to you. Quinn comes to us from Wired News, and she's going to cover everything from the battle against digital-rights management and crazy copyright legislation to the birth of extra-national data havens. Quinn's got the digital freedom beat covered, and I'm thrilled to have her aboard.

You'll also notice boatloads of less obvious changes as you flip through the redesigned mag. Font nerds will have already seen that we've switched most of the text in the magazine to a serif font to greatly increase readability, even at smaller font sizes. We've also isolated and removed many of the typesetting problems that caused us serious legibility problems in the past—hopefully, you guys can stop writing *those* angry letters too. We've renamed and revamped our Head2Head and In the Lab sections, too. Best of the Best is taking a brief sabbatical, but it will be back in a new form and better than ever in a few months.

So what do you think? Are you nervous? Scared? Slightly turned on? Either way, I'd love to hear your opinion about our new design. Study the mag, check out the changes, and shoot me an email or fill out our survey at http://maximumpc.com/designsurvey for a chance to win a $250 Best Buy gift certificate.

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KICK-ASS UPGRADES
page 22

GEFORCE 9800 GTX Reviewed
page 78

LETTERS POLICY Please send comments, questions, and Pocky to will@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Will is unable to respond personally to all queries.

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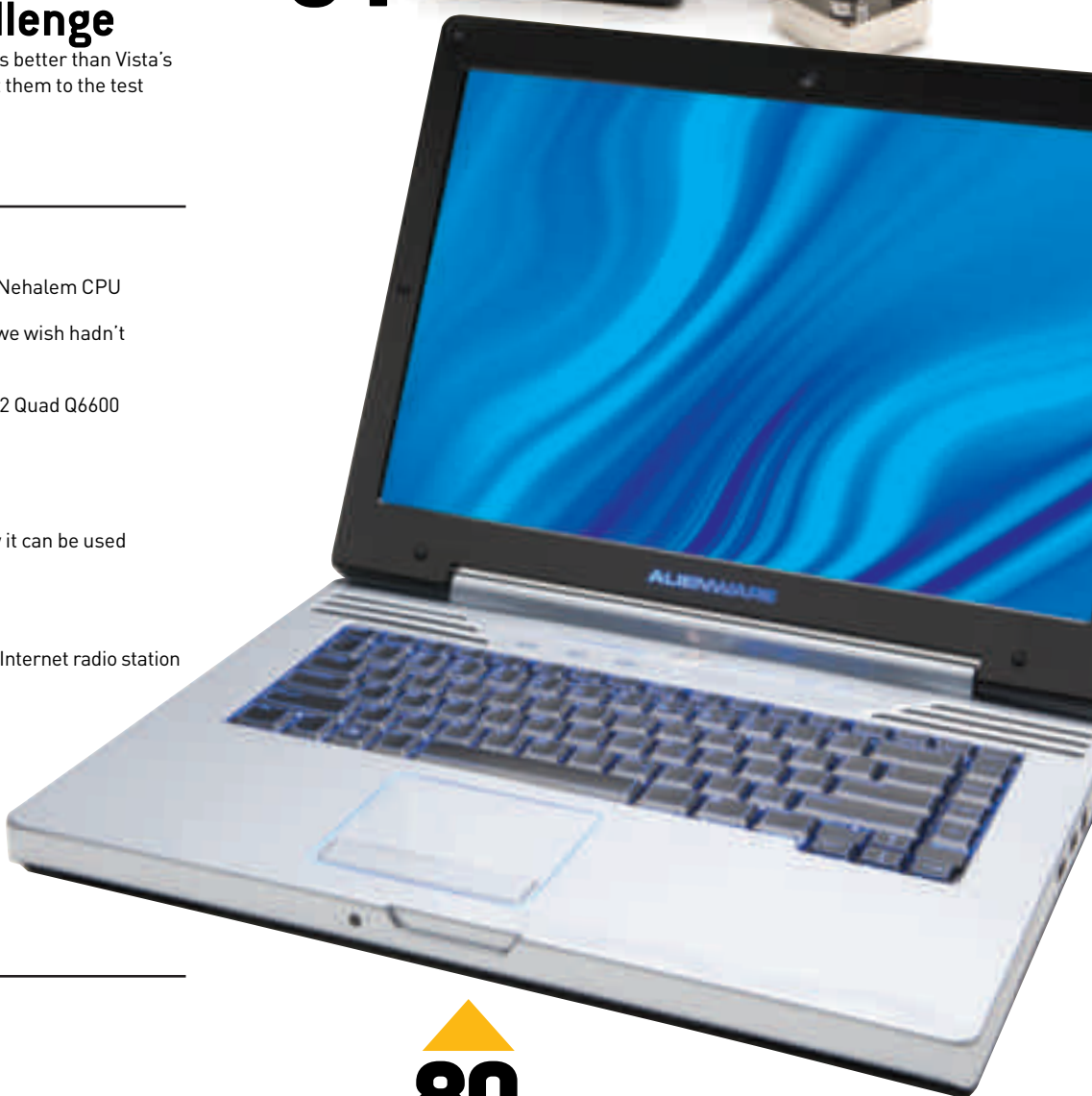

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THE NEWS

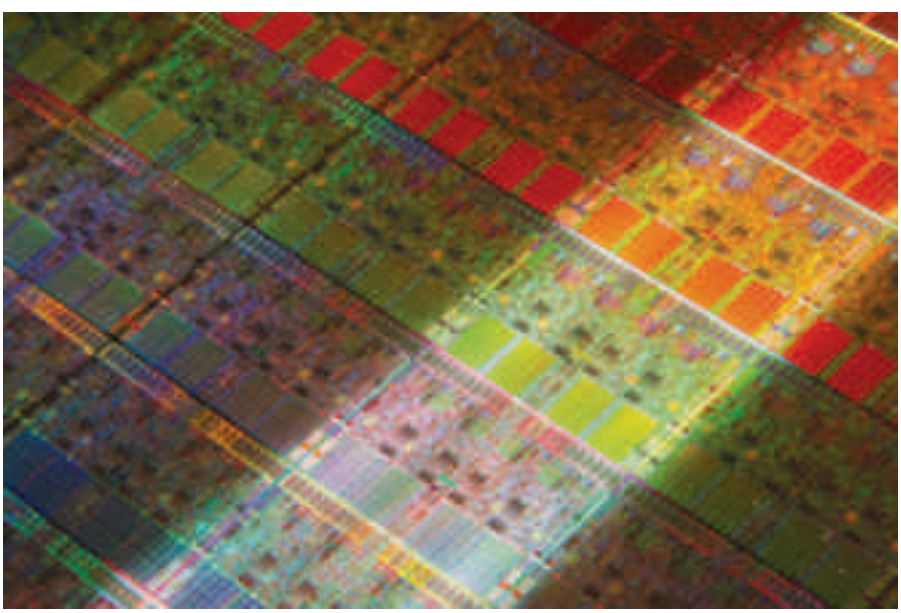
Intel Outs Nehalem

Next-gen CPU will feature a revolutionary break from the past and look more like an Athlon 64 than a Pentium —GORDON MAH UNG

At the end of *The Godfather,* Michael Corleone settles all of the family business. In some ways, Intel's road map for the next two years may have a similar impact on the companies it has warred with.

AMD? If Nehalem performs as expected, it will likely be the *bada bing* for AMD's Phenom CPU, which already lags behind Intel's existing Core 2 chips. And then there's Nvidia, which lately has been like a rock in Intel's shoe. Will Intel's Larrabee graphics turn the GeForce into the proverbial Moe Green?

Indeed, it's easy to imagine a major shakeup in the works given the revolutionary changes afoot in Intel's approach to processors and graphics. Nehalem, after all, finally does away with the much criticized front-side bus design. Since the Pentium, Intel has connected its CPUs to the chipset on the motherboard via a shared front-side bus. The design has carried over to Intel's dual- and quad-core procs, increasing the traffic on the front-side bus and the theoretical potential for a slowdown.



Nehalem will be Intel's first native quad-core design and will be built on a 45nm process.

Nehalem adopts an AMD-like design, in which each core will feature a high-speed interconnect called QuickPath to communicate with other cores. Nehalem also moves the memory controller directly to the CPU. Each Nehalem CPU will support up to three channels of DDR3 and be a native quad-core design—all four cores on a single die. Nehalem also brings back an improved form of Hyper-Threading by allowing each core to process two threads at once. With the threading, a single Nehalem would appear to the OS as an eight-core CPU while a dual-CPU rig would have 16 theoretical cores available. Addressing the criticism that Hyper-Threading was responsible for occasional performance hits, Intel says it has enlarged the cache and memory bandwidth in Nehalem to mitigate those issues.

WILL INTEL'S LARRABEE DISCRETE GRAPHICS TURN GEFORCE INTO THE PROVERBIAL MOE GREEN?

According to Intel, Nehalem is also designed to be fairly modular, so the company could easily build a quad core today or an octo core version when needed. The on-die memory controller can also be easily substituted for, say, a DDR4 or XDR interface if need be.

Performance numbers aren't available, but Intel demonstrated working hardware to the media this spring and said an official release is on tap for later this year.

As part of its one-two PR punch, Intel also talked up its secret Larrabee project, finally confirming it would be a discrete graphics card. Larrabee will feature multiple mini cores in the GPU that can be used to process graphics. One key difference between Larrabee and the graphics parts from Nvidia and AMD is that Larrabee will be rooted in the x86 instruction set. Intel says this was done to make it easier for developers to program for the new GPU. The company maintains that one of the problems with Nvidia's CUDA and AMD's GPGPU is the difficulty in programming for them. Intel's strong developer tools and familiarity with x86 programming would thus be a tremendous advantage.

Of course, that's all theoretical. The first Larrabee cards are more than a year and a half away, which gives Nvidia and AMD time to respond. Intel also has a history of fumbling in graphics. When it last tried to take on graphics in the late 1990s with the i740 and i752, it badly foundered against the nimbler and more aggressive graphics companies—one of which was Nvidia.

Apple Settles Screen Suit

A simple side-by-side comparison of a 6-bit and an 8-bit LCD panel reveals an obvious difference in image quality. It's the difference between 262,144 and 16.7 million discrete colors. And while 6-bit panels typically use techniques such as dithering or frame-rate control to simulate a larger palette, their output still can't reach that of an 8-bit screen—although many manufacturers would like you to believe otherwise.

This issue is at the heart of a lawsuit two plaintiffs brought against Apple over the screens in the company's MacBook and MacBook Pro notebooks. The plaintiffs, who described their notebooks' displays as "grainy" and "sparkly" felt duped by the "millions of colors" Apple touted in its advertising. That Apple recently settled the suit suggests they were right. —KS

Canada Begins BitTorrent Broadcasting

The Great White North is embracing the distribution protocol shunned by its broadcasting neighbors to the south, matching an increased European interest in providing legal BitTorrents for popular television programming. As of March 24, the Canadian Broadcasting Corporation began mirroring a successful Norwegian experiment by seeding DRM-free versions of its programming—*Canada's Next Great Prime Minister*, in this case—the day after the program's on-TV airing.

The move comes on the heels of a 15 million euro investment by the European Union to jump-start development of an upgraded version of the BitTorrent protocol. In conjunction with a 4 million euro donation from 21 other telecommunications partners, the EU wants BitTorrent to become the technological basis for Europe's "next-generation Internet television distribution system." —DM

Retailers Make Good on HD DVD

The news isn't all bad for HD DVD adopters. Electronics retailers are reaching out to owners of the now-obsolete high-def disc players with various conciliatory offers—in hopes of getting their Blu-ray business, no doubt. If you bought an HD DVD player from Best Buy prior to February 23, the retailer will give you a $50 gift certificate—you don't even need to return the player! Best Buy is also accepting used HD DVD players purchased from any retailer, in exchange for a gift card (the value depends on the model). For its part, Circuit City is allowing its customers to return HD DVD players within 90 of purchase in exchange for store credit. —KS

Intel's Atom: the Smallest x86

Intel's new Atom processor is a momentous move by the world's biggest chipmaker. No other x86 processor can match Atom's combination of low power consumption, small die size, modest manufacturing cost, and good performance.

Atom will carry the x86 where it has never gone before—especially into new types of ultramobile systems with wireless Internet connectivity. (Intel calls them "mobile Internet devices," or MIDs.)

Two things stand out from my analysis of Atom. First, it's not crippled. It's an up-to-date 64-bit x86 architecture with the latest virtualization extensions, Supplemental SSE media extensions, and dual Hyper-Threading (some features, such as Hyper-Threading, are optional). Intel decided that 100-percent x86 compatibility is more important than saving power by simplifying the notoriously complex x86 architecture.

Second, Intel slashed power consumption in many little ways without seriously harming performance. Without question, Atom is slower than existing PC processors. But it's still capable of acceptably running Windows Vista, even with Aero graphics, while drawing significantly less wattage than a typical "low-power" notebook-PC processor. At Intel's labs in Austin, Texas, I saw production silicon running Vista at a core voltage of just 0.875V while drawing less than one watt. Performance is much better with Linux, which will probably be more common on MIDs.

The design of the front-side bus is but one way the Atom saves power. Normally, Intel processors use Advanced Gunning Transceiver Logic (A/GTL+) to drive this vital I/O interface. Atom uses CMOS logic. It's slower but draws power only during signal transitions, not while idle. Although the CMOS transceivers save less than half a watt, little things like this add up. And Atom also has A/GTL+ transceivers, so Intel can offer the chip either way.

My only reservation is whether full x86 compatibility is really necessary in MIDs and the other consumer-electronics products that Intel covets for Atom. If full compatibility isn't vital, Intel has missed a chance to streamline the x86 architecture for greater power efficiency, yielding an advantage to RISC processors. But if the market demands x86 compatibility, Atom has a clear advantage that RISC rivals can't match.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

Verizon Wins at FCC Auction

Telecom gains wide swath of valuable wireless spectrum

Verizon Wireless was the big winner in the FCC's auction of 700MHz spectrum previously used by UHF television. The telecom entered a winning bid of $9.63 billion to collect a near-nationwide swath of the C block, which is particularly valuable because it can travel long distances and penetrate through walls, making it well-suited for data and voice transmission.

capable of 100Mb/s downloads and 50Mb/s uploads. In conjunction with its winning bid, Verizon has been moving forward with its open-access plan and reiterated that any device or service that meets minimum technical specs will be allowed on its network.

AT&T also spent big at the auction, paying $6.6 billion for 227 regional licenses in the B block.

Verizon's winning bid eases the way for the creation of a nationwide 4G network.

WITH THIS SPECTRUM, VERIZON IS EXPECTED TO BUILD A 4G WIRELESS NETWORK BASED ON LTE TECHNOLOGY.

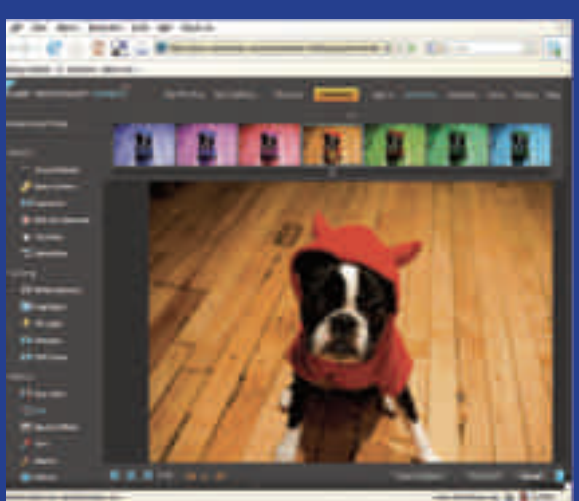
With this spectrum, Verizon is expected to build a 4G wireless network based on LTE technology, which is

Although the auction raised a total of $19.6 billion, which will be used to fund the transition to digital TV, the D block failed to meet its $1.3 billion reserve price and remains unsold. This swath of spectrum was viewed as less desirable because it must be shared with first responders during emergencies; however, consumer groups have alleged that the D block's failure to sell is due to tampering by one of the companies involved and have asked for a congressional investigation. —TE

PREVIEW

Photoshop for Free!

Adobe officially joins the web 2.0 revolution with its beta release of Photoshop Express. The free online image-editing service offers an array of tools for fine-tuning your digital pictures and 2GB of space on which to store them. You can influence the final product by providing Adobe with feedback on the beta. —KS



GAME THEORY

Grand Theft Childhood?

Have you heard the one about the 3,500 research studies that show a positive relationship between media violence and violent behavior? It's an old cudgel often used to bludgeon the gaming industry in the debate about violent games.

It also turns out to be a complete fabrication. Those 3,500 studies simply don't exist. In extensive research for their own study, Lawrence Kutner and Cheryl K. Olson (founders of the Center for Mental Health and Media at Massachusetts General Hospital and professors at Harvard Medical School) searched the available literature and found only about 300 studies on this topic. In their new book, *Grand Theft Childhood,* Kutner and Olson conclude that most of the previous studies were either inconclusive or flawed, with none providing the smoking gun linking media violence and real-world violence in an incontrovertible cause-effect relationship.

They decided to go looking for the link themselves and created what is arguably the most far-reaching and thorough study yet. The results may not be what either side of the debate wants to hear, but after reading their results, it's hard to deny that Kutner and Olson's report is scrupulously fair—and that it's a bombshell.

They begin by making the crucial distinction between youth violence, which they define as an attack on a person or thing with the intent to injure or break it, and the less easily defined aggression, which includes antisocial behavior, bullying, and delinquency. Their research reveals two key facts that are relevant to the debate.

First, there is no link between young people who play violent games and actual violence. In fact, as gamer culture has grown, incidents of violent crime have dropped significantly. They also debunk the myth that school shootings such as the ones that took place at Columbine (blamed on Doom) and Virginia Tech (Counter-Strike) were caused by games. Instead, they learned that Virginia Tech shooter Seung-Hui Cho didn't play games in college, which tallied with one of their more interesting discoveries: Kids who don't play games are the social outcasts and misfits. Games help kids fit in and form relationships. Their study did, however, find a connection between aggression and violent games, and we'll explore that in more detail next month.

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

Keyboard Quiver

Yes, the Keyboard Quiver serves as a protective tote for your keyboard, keeping it safe from dust, grit, and moisture. There's even room for discs, your MP3 player, and a phone—though, no place for a laptop. But the bag costs more than most keyboards! And we question whether a plank even needs this extreme level of protection. —WS
$70, www.dust-offzone.com

Comcast Ends One Evil Practice, Tests Another

Company will stop interfering with file-sharing 'eventually'

Facing a steady stream of public criticism—and increasing scrutiny from the FCC—Comcast announced an initiative with BitTorrent, Inc. to develop a "protocol agnostic" capacity-management system for its high-speed Internet service by the end of 2008. In other words, it plans to stop interfering with customers who engage in legal file sharing.

But lest you think the leopard has changed its spots, consider what blogger Chris Albrecht has uncovered: Comcast may be testing DVRs with built-in two-way cameras. A set-top box capable of distinguishing between members of your household would enable the company to serve up advertisements tailored to whoever is watching. —MB

Nvidia Crashes Vista Party

Documents unsealed by a judge overseeing a class-action lawsuit against Microsoft reveal that Nvidia's G80 Vista drivers were responsible for almost 29 percent of all logged Vista crashes during a portion of last year. The documents don't provide much in the way of detail, not even the specific time period in which the data was gathered, but the results make it clear that Nvidia has had significant problems supporting Vista.

This state of affairs could have contributed to the perception that Microsoft's new OS was buggy and unreliable; on the other hand, Microsoft's own drivers were the next single biggest problem, causing nearly 18 percent of logged Vista crashes. The report blamed AMD videocard drivers for nine percent of reported crashes, while Creative Labs accounted for just one percent; a full 17 percent were labeled simply as "unknown." —MB

Windows Mobile Upgrades

Microsoft has announced the upcoming release of a new version of Internet Explorer Mobile that will supply users with the "desktop grade" browsing experience iPhone owners currently enjoy. And unlike the iPhone's browser, the new mobile IE will support flash. Handsets capable of running the new browser are expected to hit the street by the end of the year. —TE

BYTE RIGHTS

Fair Use Manifesto

Hi, I'm Quinn Norton, and I'll be your new *Maximum PC* guide to intellectual property—that's copyright, patents, and so on for the unwashed non-lawyer masses. It's a wacky field. In the past few years, this once extremely dry bit of law has spawned everything from Swedish street protests over The Pirate Bay website to more than 20,000 RIAA lawsuits—including four college kids sued for around $100 billion. That's right around the GDP of Peru. See? Wacky.

I've been acting out my unhealthy interest in issues like copyright and copy protection for 10 years, or a lot longer if you include teenage adventures in game dongle subversion (not to advocate piracy, or 90 percent of the other things I did as a youth). I've spent years trying to make intellectual law easy to understand for people with more healthy and normal interests. Also, I tend to drink a lot with IP lawyers.

This will be a space for me to explain the news, share some stories, and point out details most people have almost certainly missed. I might even try to tell you what's likely to happen next.

Here's where I stand: I'm with the Norwegian government in that accusing you of hacking your own computer is incoherent. I tend to agree with Thomas Jefferson that copyright is there to encourage the useful arts and sciences. Though if we really wanted copyright to encourage the useful arts and sciences, it would last just as long as you need to get the next thing done, and the end of term would be accompanied by a team of ninjas "encouraging" you to get back to work.

I think I agree with most people that the last eight years have shown that the Digital Millennium Copyright Act is simply the stupidest bit of law passed since we thought banning beer was a good idea. I heart Creative Commons giving people options to share and I giggle at overreaching patents. I find the way trade secrets get used alarming. And I think fair use is a good thing, like love, puppies, and Christmas.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

10 Failed Technologies We Wish Had Survived

10 KNOBS

Buttons might look sexy, but we miss the tactile feedback of a good old-fashioned knob.

9 KEYBOARDS WITH REAL SWITCHES

8 RAMBUS

Royalty-laden and ex[illegible]ive, but Ra[illegible] smok[illegible]

7 MINIDISC

Rewritable discs in 1992? That sounds *great* to us!

6 DVD-AUDIO

We loved the high-definition multi-channel audio but hated the DRM.

5 CRTs

Sure, they're big and unwieldy, but they look great at *every* resolution.

4 TUBE AMPS

Digital amps may be cheap and efficient, but nothing beats the warmth of an old-fashioned tube amp.

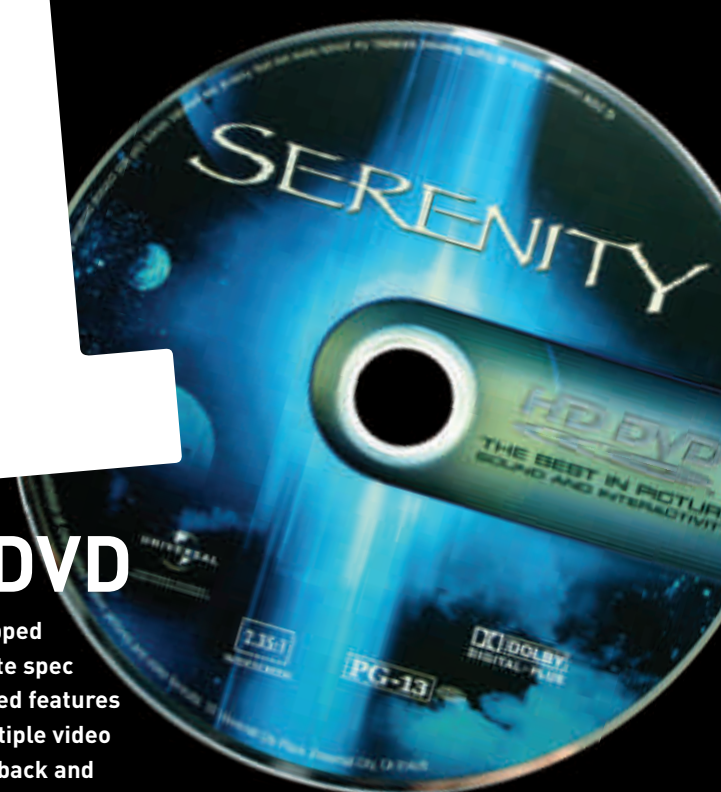
3 THE AMIGA

OK, OK! We recognize the significance of the Amiga! Stop emailing us already!

2 APPLE NEWTON

If Steve the Savior hadn't killed the Newton, we would have had an iPhone years earlier.

#1 HD DVD



HD DVD shipped as a complete spec with advanced features such as multiple video stream playback and crazy-cool menus. Not included: massive sacks of cash to movie studios.

DEATHMATCH

Intel Core 2 Q6600 vs. Intel Core 2 Q9300

Intel's 2.4GHz Core 2 Quad Q6600 has been the darling of penny-pinchers since day one. Selling for around $250, the 65nm-based Q6600 is just 600MHz slower than its pricier dual-core brethren, but otherwise, spec for spec, they're the same.

So when Intel rolled out its 45nm-based Penryn blue-light special, we knew a deathmatch was in the works. Priced the same as its Conroe counterpart, the Core 2 Quad Q9300 offers the improved Penryn core with its faster clock speed and front-side bus. But while the Q6600 is pretty much the same chip as the $1,000 Conroe jobbies, the Q9300 has half the cache of the top-gun Penryn CPUs—less, even, than the Q6600, for that matter.

That made us wonder whether the Q9300 is actually even better than the beloved Q6600. To find out if the Q9300 takes down the Q6600 or falls on its face, read on. **—GORDON MAH UNG**

INTEL CORE 2 QUAD Q6600
$266, www.intel.com

ROUND 1

PRICE

The Core 2 Quad Q6600 didn't start off as a budget chip, but it got there quickly thanks to generous price cuts by Intel. Today, it's officially listed at $266 in bulk but is retailing for as little as $240. Intel's new Core 2 Quad Q9300 is listed at the same price—$266 in bulk—but thanks to the laws of supply and demand, it's going for $300. That gives the Q6600 a 20-percent price advantage. Given the general affordability of quad cores, we think all power users are winners, but one product clearly takes this category.
Winner: Q6600

ROUND 2

SPECS

Specsmanship in CPUs still matters, even if *Maximum PC* readers know it can be misleading. The old Q6600 clocks in at 2.4GHz on a 1,066MHz front-side bus, uses the older 65nm process, and features 8MB of L2 cache. The newer Q9300 clocks in at 2.5GHz on a 1,333MHz front-side bus using the new and improved 45nm core, but its L2 cache is only 6MB. That's 2MB less than the Q6600 and half that of the top-end Core 2 Extreme QX9770. Breaking it down, the Q9300's clock speeds are about 4 percent faster and its front-side bus is 25 percent faster, on a process that's about 45 percent smaller. Its cache, however, is 25 percent smaller. Nevertheless, the Q9300 has a slight edge in specs.
Winner: Q9300

ROUND 3

COMPATIBILITY

Even we admit that Intel is getting better at not screwing folks with motherboard incompatibility, but it could still learn a lesson from AMD or even the Intel of old, which allowed you to house three generations of processors in its Slot 1 motherboard. When it comes to dropping the latest quad-core proc into an existing dual-core mobo, the winner is the Q6600. While it won't work in every Socket 775 board, it stands a better chance than the newfangled Q9300, which pretty much works only on motherboards made in the last 12 months. Of course, check your board for compatibility first, but we're still giving this to the Q6600.
Winner: Q6600

ROUND 4

OVERCLOCKING

There's a reason the Q6600 is beloved. The second iteration of the CPU, the step G0 versions, are agile overclockers. For this test, we had the 2.4GHz CPU running at a very stable 3GHz, and we figured another couple hundred megahertz were attainable with fine-tuning. That's probably the outer edge of what the Q6600 is capable of without serious tweaking and cooling. We expected the Q9300 to do better—and it did. On the same nForce 790i Ultra board, the Q9300 pushed 3.5GHz on a 2,000MHz front-side bus without breaking a sweat. Mind you, both overclocks were done with a stock Intel cooler, so your mileage may vary. Our verdict? Both are good overclockers, but the Q9300 is better.
Winner: Q9300

ROUND 5

PERFORMANCE

We tested the Q6600 with 15 gaming, encoding, and other CPU-intensive benchmarks and then dropped the Q9300 into the same board and reran the tests. The Q9300 won almost every test with margins of from 3 percent (nothing to crow about) to 14 percent (crow away!). The Q9300 lost only our FEAR benchmark, and only at low resolutions. This round easily goes to the Q9300.
Winner: Q9300

INTEL CORE 2 QUAD Q9300
$266, www.intel.com

LEARN MORE AT MAXIMUMPC.com
http://www.tinyurl/2wfqmu

And the Winner Is...

We initially thought the smaller L2 cache would handicap the Penryn-based Q9300; however, the cache deficit didn't really matter and this CPU did quite well, beating the Q6600 by as much as 14 percent in some tests. In others tests, the Q9300's performance was just about what you'd expect from a CPU with a 5-percent clock-speed advantage.

Our conclusion, based on these tests, is that if you're building a budget quad-core today, you should reach for the Q9300 over the Q6600. However, if you're looking to upgrade your older P965 or nForce 680i board from its dual-core or single-core proc and it won't support Q9300 (or any quad-core Penryn for that matter), the Q6600 is still a worthwhile upgrade, especially given its $240 street price.

Our consumer advocate investigates...

Glitchy Galaxy Tech Cards

SP3 Spoof

Dog Bites Mad Dog

Never Give Up, Never Surrender

I built a new PC using a Galaxy Tech GeForce 8800 GT videocard that I bought from Tiger Direct. Two weeks later, I started getting artifacts and my system would freeze up while playing Crysis or Call of Duty 4. I got a replacement from Tiger, but three months later, that card also went kaput and created the same red and green diagonal lines and lockups that afflicted the original card.

As it had been so long, I went directly to Galaxy Tech for warranty support. Four emails and two voicemail messages later I have received only one response giving me a case number. They didn't supply any information on how to return the card, and the website doesn't tell you how to do this either.

Help! I just want to get one of the following: a warranty replacement for the videocard or, better yet, my money back. I am having a hard time trusting Galaxy Tech and the 8800 GT line of cards at this point.

—Jim Rodgers

A reader says Galaxy Tech's videocard support is far, far away....

The Dog pinged Hong Kong–based Galaxy Tech and heard from a spokesperson named Jam who said: "We appreciate your concern and your allowing us to explain what happened. Galaxy Tech did, in fact, reply to Jim and tried to solve his problem, but we did not receive feedback from him until receiving your email (as you can see from the attachment). An RMA for the card is not a problem, but we're not sure that is the solution. We were in the process of trying to troubleshoot [the problem] when Jim elected to contact *Maximum PC*.

"If there is a problem with his system, no matter how many cards we replace, the problem will not go away. We're sure that you understand this point well. We also understand his concern, but we need his cooperation as well. We would like to solve this and deliver the best service to him!"

The Dog put both Jim and Jam in touch. Jim believed that his PC was not the culprit and asked that Galaxy Tech let him exchange the board for another. Although he was not happy that Galaxy Tech would only ship a replacement card after he sent his board back, Jim did get a new 8800 GT.

Duped by Automatic Update

When Windows XP's automatic update said I had to download SP3, I said what the heck. If Windows says I should do it, it must be right. Now after many reboots, booting in safe mode, and finally a system restore, I have my computer back to its stock performance. Please warn your readers about the dangers of SP3.

—Noel Puthenveetil

The Dog has no trouble heaping dog paddies on Microsoft's feet when it's well deserved, but the Dog isn't sure it's Microsoft's fault this time. You didn't say which SP3 you were prompted to download, but the Dog assumes it was SP3 for Windows XP not SP3 for Office 2003 or SP3 for Windows 2000, which was released in 2002.

Microsoft hasn't even released SP3 for Windows XP yet. At press time, SP3 was still in a release candidate phase. RC versions of SP3 have been available since late last year but the only way to get SP3 to show up as a download on Windows Update is to change a registry key. So unless you unwittingly fired up regedit and changed the entry, it's unlikely that Windows Update would have pushed SP3 out to you. A more plausible answer is that some kind of malware got onto your machine and is doing dastardly things, so you may want to examine your system for suspicious invaders.

Mad at Mad Dog

I bought an external Mad Dog Multimedia hard drive enclosure last summer. It ran for 10 minutes and stopped working. I touched the power brick and it was very hot. I replaced the brick with one from an older Mad Dog enclosure I have

and it worked fine.

So began my six-week journey to get Mad Dog to replace the brick. The responses ranged from "it's being looked into" to no response at all. In September, I was finally given an RMA and shipped the brick back. A few weeks later I contacted the company and was told that the RMA was given by mistake and that the company was still trying to come to a conclusion as to whether the brick was under warranty. I have not heard from Mad Dog since. I've tried contacting the company for an update but have heard nothing.

So far I have an external case with no power supply, a receipt for $6.15 for the postage to send the part back, and whatever the phone calls have cost. This has been going on for seven months now. Want a good laugh? Check out the support page on the Mad Dog website. It brags about the great service.

—Edwin Kanady

ONLY APPLE COULD TURN A SIMPLE USB CABLE INTO A PROPRIETARY HUNK OF JUNK...

The Dog also tried several times to reach Mad Dog Multimedia to hear its side of the story. Even emails sent directly to Adam Colton, the chief financial officer of the company, went unanswered. That's no surprise, though. The Better Business Bureau gives the company a thumbs down and has logged 74 complaints about it in the last three years. Consumers posting on Ripoffreport.com vented about unfilled rebates, while a story on the *Washington Post*'s website told of a reader who had two bunk graphics cards from the company and was working on a third.

What exactly is going on with Mad Dog? It's not clear. The main number the company lists for rebate information has been disconnected and the number for tech support gets you voicemail. Given the company's inability to reply to consumers' email, let alone the Dog's requests for information, does anyone really want to risk buying Mad Dog hardware? The Dog certainly wouldn't and recommends that readers steer clear of the company's products. Woof.

All Stick, No Carrot

After my kids destroyed my iPod Shuffle's dock (only Apple could turn a simple USB cable into a proprietary hunk of junk that costs $30 to replace), I went on the hunt for a cheaper and simpler idea. I thought I found it with Carrot Idea's Flexible Dock, but after more than a month of waiting, and having paid $10 for the cable, I have heard nothing—and worse, I've received nothing. The money lost isn't much, but it's the principle. Please let other folks know not to order from this store. I guess I'll just have to buy a second iPod Shuffle and use the dock for both.

—Stephen Palmer

It must be the month for companies not to respond to the Dog because Carrot Idea representatives haven't answered the Dog's emails requesting information on the company's status.

Although the website shows a mailing address in San Jose, CA, the Dog could not locate a phone number for it nor could the Dog locate any papers of incorporation with the California Secretary of State. The actual physical address is likely just a mail drop, though, as a Postal Connection is located at the same address as Carrot Idea. The good news is that the Dog found few gripes about Carrot Idea at the usual agencies that track complaints.

The company actually describes itself as "a leading manufacturer of computer accessories founded in Seoul, South Korea," so it's quite possible distance is to blame for the lag in sending your hardware out. It's not total flim-flam, as others have reported receiving the Flexible Dock. There is another option, however. Incipio makes a similar cable that costs even less than the Carrot Idea Flexible Dock. It's available at www.myincipio.com/product/IP-300 for $6—far cheaper than a new Shuffle. And, of course, the Dog recommends that readers steer clear of Carrot Idea for now. Woof.

EMAIL THE WATCHDOG If you feel you've gotten a raw deal and need assistance setting a vendor straight, email the Dog at watchdog@maximumpc.com. Please include a detailed explanation of your problem as well as any correspondence you have sent concerning the issue.

WE CAN REBUILD IT

Why suffer the subpar performance of an old retail PC? Your computer can be made better, faster, stronger. We have the technology, so let us show you how

BY GORDON MAH UNG

So your store-bought PC is getting a little long in the tooth and its performance is showing signs of age. You might be tempted to just toss the machine and replace it with a newer model, especially when you see that more powerful OEM PCs can be had for as little as $500. But before you get on the horn to Dell, ask yourself this: What would a power user do (short of having built their own rig to begin with, naturally)? The answer: upgrade.

In many instances, you can achieve even greater performance gains with a $500 upgrade than you can from a new $500 machine. Even Dell's proprietary builds can be retrofitted into better shape.

The skill is in knowing when it's right to upgrade and how much upgrading is warranted. Too often, what begins as a simple upgrade can end up as a box full of regrets. Instead of achieving blistering performance, people often find that they've just thrown good money after bad hardware.

This brings us to the first rule of upgrading: Know your needs. Are you after higher frame rates and the ability to game at higher resolutions? You'll need a new graphics card. Are you tired of waiting hours for your video editing to finish or the eternity it takes to edit your photos? A new CPU is in order.

After you've determined your goals, set a budget. Can you spend $200 or $2,000? Finally, the hardest question will be whether it makes sense to even perform an upgrade. This is the part that usually trips us all up. Folks are often compelled to upgrade old machines out of loyalty, as though that box of silicon, tin, and plastic was the starship *Enterprise*. The truth is that it's just a bunch of commodity parts that you probably can't sell on eBay for a quarter of what you originally paid.

So ask yourself, does it make sense to spend $250 on a 3.4GHz Socket 478 Pentium 4 for that old 2.6GHz P4 box? Do you really want to buy a $200 AGP card for your Athlon XP system? We're not so sure.

Even worse, like plumbing and car repairs, oftentimes upgrades can cause you to replace more parts than you originally intended. Say you buy a hot, new AGP card for your Athlon XP 3000+ box. You'll soon discover that the PSU in your vintage machine is underpowered. New PSU. *Cha-ching*. But now that swanky PSU doesn't fit in your case. New case. *Cha-ching*. In the end, you just spent $500 for minimal performance gains.

Over the following pages, we'll walk you through three real-world upgrade scenarios using three very different old off-the-shelf computers, so you can see first-hand our approach to bringing these rigs up to modern standards. Your upgrade needs won't necessarily be the same, but by understanding how we made our decisions concerning what to upgrade, you'll be more prepared to tackle the task yourself.

ILLUSTRATION BY SHANNON BRADY

CASE STUDY 1

Dell P4

This is the very bottom end of what we'd consider upgrading

When it was released almost three years ago, Dell's Precision 370 (a business-class workstation version of the Dimension) was state of the art with its PCI Express and DDR2 RAM. Today, the box is an ancient hunk of junk that wouldn't fetch $150 on Craigslist.

The Precision 370 features a 3.8GHz Pentium 4 proc, 1GB of DDR2 ECC, a FireGL V3100 graphics card, an 80GB SATA hard drive, and a combo DVD burner. Our initial plan was to replace the single-core Pentium 4 with a Core 2 or even a Pentium D, but the board uses an Intel 925X chipset, which doesn't support any dual-core procs. There was one processor upgrade option left, however: The 3.8GHz Pentium 4 in the Precision is a 1MB L2 Prescott. Intel later released a Pentium 4 670, which was pretty much a 3.8GHz P4 but with 2MB of L2 cache.

Another seemingly easy upgrade is also complicated by the machine's workstation roots. The Precision 370 uses ECC DDR2 DIMMs. That RAM is more difficult to find and typically carries a slight price premium.

Given all of this motherboard's negatives, we thought about replacing it outright, but this is a Dell, and like many large OEM rigs, this machine sports a proprietary design. There's no way in hell you're going to drop a standard ATX motherboard into this case.

The weakest link in the Precision is the FireGL V3100 graphics card. This 128MB frame-buffer card with a four-pixel pipeline is just about unusable. The card's best attribute is that it's PCI Express. Overall, this machine is borderline recycle-bin material, but the support for PCI Express and DDR2 convinced us to give it the old upgrade try.

In its current configuration, it is absolutely useless for gaming and is a mediocre machine for video and photo editing. A new $500 box (see sidebar below) beats it up and down. But let's see what kind of performance improvements our upgrades can muster.

REALITY CHECK

To Upgrade or Start Fresh?

Before we started, we established a minimum basis for comparison. After all, if you spend $500 on an upgrade, will you really be getting better performance than what a new budget PC with a warranty offers? To establish our low bar, we looked at the $500 configs of several large OEMs and built a comparable baseline machine to see how well our upgrade boxes would perform against a brand-new, inexpensive PC. Turns out, you can get a surprisingly good machine for five Bennies—we're talking a dual-core 1.8GHz Pentium E2160, with 2GB of DDR2, a 250GB hard drive, an Intel Q33-chipset motherboard, and even an 8500 GT–class card. That's good eats for the price and a good platform for future upgrades. Later on, you can go quad core with either a 65nm or 45nm Intel CPU and drop in a faster GPU.

This baseline config should serve as a guide for deciding whether an upgrade is worthwhile, and if so, how much is reasonable to spend. If you don't think your upgraded machine can outperform this configuration, it's time to start fresh.

Our Dell Upgrades

We turned this turkey into a usable machine that would give us moderate gaming performance and handle most medium-intensity tasks. We concentrated our upgrades on graphics, RAM, and a drop-in hard drive for additional storage capabilities.

GPU

Since the 3.8GHz P4 CPU is still serviceable (albeit barely), our first upgrade target was the substandard FireGL V3100 graphics card. We looked at two contenders: Nvidia's GeForce 9600 GT and the GeForce 8800 GT. Both feature 512MB frame buffers, but the 9600 GT sports the newer G94 core. The 8800 GT is faster at higher resolutions, but given the potential of a single-core Pentium 4, we felt it was more prudent to save our ducats for now. Still, putting in a $160 card takes us from a machine that's worthless at gaming to one that can play most of today's popular titles at normal resolutions. Even better, GPUs are in flux now. AMD and Nvidia are in a GPU price war, so expect the 9600 GT to be even cheaper by the time you read this.

Before the GPU upgrade, the Precision was about 75 percent slower than the $500 box in our Unreal Tournament 3 benchmark. After the upgrade, the Precision was 158 percent faster.

TOTAL UPGRADE COST: $369

RAM

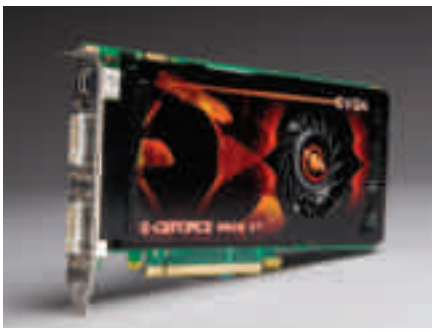
With RAM as cheap as it is these days, it's an obvious upgrade choice. It's so cheap, in fact, we decided to ditch the two 512MB ECC DIMMs in the Precision and replace them with a pair of standard 1GB Corsair DDR2/667 modules for $40. Some people believe that ECC RAM slightly hinders performance, but we were more motivated by the performance benefits we'd gain by moving the machine from its 1GB of RAM to 2GB—the optimal amount for a 32-bit OS.

CPU

As we mentioned earlier, the system's 925X chipset prevented us from using dual-core processors, to say nothing of quads. The one option available is the 2MB L2 version of the Pentium 4 Prescott that Intel released near the end of that CPU's run. The P4 670 can still be had if you search the nooks and crannies of the Internet, but once you find one, be prepared to shell out some bucks for it. The two sites we found that stocked the processor were charging $199 for it. Even the secondary market—that's fancy speak for "used"—wanted $100 for a 3.8 P4. That just ain't worth it. Doubling the L2 cache gets you, what, maybe a few percentage points of improvement in a few applications? It's not worth the money or the hassle. The highest clocked single-core Pentium 4 is still a dog, but not dead meat on a stick, so we're sticking with it. Our ProShow Producer test pegs the P4 at about 30 percent slower than the $500 rig's 1.8GHz dual-core Pentium, while PCMark05 puts the P4 slightly ahead.

HARD DRIVE

You know things are bad when your iPod has more storage capacity than your computer. The 80GB drive in the Dell isn't even big enough to be puny. To supplement our storage, we dropped in a $169 Seagate 750GB Barracuda drive for secondary storage. Hard drives (and to some extent optical drives) usually break the upgrading rules on spending because they're easily transportable. Even if we paid $500 for two 1TB drives, we could easily move those to the next machine that we build.



A $160 GeForce 9600 GT is several times faster than the ancient ATI FireGL V3100 that came with the Dell.

Instead of hunting down ECC RAM, we replaced the rig's pair of 512MB DIMMS with a pair of 1GB DIMMs. Don't mix 'n' match ECC and non-ECC though.

A $169 Seagate 750GB drive makes good upgrade sense, as it can be easily transplanted into a new machine.

BENCHMARKS

	New $500 box	Pre-Upgrade	Post-Upgrade	% Change
ProShow (sec)	**2,528**	3,606	3,606	0%
PCMark05 Overall	**4,785**	3,460	4,029	16%
PCMark05 CPU	4,635	4,805	**4,806**	0%
PCMark05 RAM	3,966	4,400	**4,425**	1%
PCMark05 GPU	3,750	1,653	**10,390**	529%
PCMark05 HDD	**5,877**	4,497	4,576	2%
UT3 Omicron Bot (fps)	18	5	**46**	838%

Best scores are bolded.

CASE STUDY 2

CyberPower Core 2 Duo

Can a PC have a midlife crisis? This one did. Watch it go from pudgy and out of shape to pimpin'

Our CyberPower box is easily the most capable machine in this upgrade story. A circa 2006 rig, the CyberPower's configuration is still quite powerful. At the heart of it is an Intel Core 2 Duo E6700. That's a 2.66GHz dual core on a 1,066MHz front-side bus. The chip is riding in an Intel D975XBX Bad Axe board with 2GB of DDR2 and a 250GB hard drive for storage. In the GPU department, an ATI Radeon X1950 XTX runs the show.

But while these components are still quite serviceable, they're far from what most power machines are running today. In fact, we'd say everything in the CyberPower would qualify as mediocre by present-day standards. The Intel 975X board, though, somewhat limits our upgrade options. Built for the Pentium D processor, the 975X— at least the revision here—works with most 65nm Core 2 CPUs but not the newer 45nm CPUs. The board also lacks official support for 1,333MHz front-side bus CPUs, but it will unofficially recognize and work with the Core 2 Extreme QX6850 CPU and other 1,333FSB 65nm parts.

Clearly, the weakest component here is the machine's hard drive, which is sorely lacking in capacity. After that, it's really a toss-up as to whether the Core 2 Duo E6700 or the Radeon X1950 XTX is more in need of replacement. In gaming, the X1950 XTX is long in the tooth but still quite capable of playing most modern games at 1280x1024 resolution. Push the resolution to fill a 24-inch or 30-inch flat panel, however, and the card runs out of steam with more punishing titles such as Crysis. The Core 2 Duo E6700 is one of the original Conroe chips launched almost two years ago. It has since been eclipsed by quad-core Conroes (and, of course, Penryn-based chips). Nonetheless, upgrading either of these components will give the machine a reasonable peppy boost in performance.

TOUGH QUESTIONS

Upgrade Scenarios that Lack Clear Answers

Lawyers like to say that hard cases make bad laws. The same logic applies to system upgrading—borderline configurations really challenge you to take a long, hard look at what to do with your machine. In two scenarios we're really torn on whether or not to upgrade.

AGP: As a general rule, we feel that AGP isn't just dead, it's dead, buried, and has turned into fossil fuel. However, there *are* situations in which adding a $150 card will give a Pentium 4 or Athlon 64 AGP machine a short reprieve. Nvidia has pretty much called it quits on AGP, but AMD is planning on launching a new Radeon HD3850 with the old-school interface. If it's priced right, the card should buy AGP Pentium 4 users and Athlon 64 machines another year of life. Still, you'll have to really ponder whether this is a wise investment, as even a bottom-end Pentium dual-core system will spank either CPU.

SOCKET 478: The same upgrading trepidation applies to Socket 478. Beyond dropping in a little more RAM, you're left with the prospect of chasing down an elusive Gallatin-core P4 Extreme Edition and then paying $400 for it, which seems unwise to us.

Our CyberPower Upgrades

As we've said, the upgrades here are borderline optional, as this machine is still very useful. But presented with an unexpected windfall of cash or permission from the family CFO, here's how we'd bring this already capable machine up to modern specifications.

GPU

The Radeon X1950 XTX was a competitive card in its day, with full HDCP support (albeit single-link only). Unfortunately, GPUs age far faster than most components in your PC. So our two-year-old GPU is akin to a three-year-old CPU or a four-year-old optical drive.

TOTAL UPGRADE COST: $920

We thought about adding a second Radeon X1950 XTX to the machine but got cold sweats at the thought of trying to use the original permutation of CrossFire. Instead of the internal bridge that's used in SLI and modern CrossFire setups, the old system uses a clumsy, unreliable dongle cable. Worse yet, we couldn't just grab any two X1950 cards, one of the cards had to be an X1950 XTX "master card." Well good luck, buddy. We looked around and couldn't find any reputable establishments selling master cards. In the used market, people wanted $250 for them, so we opted to just remove the X1950 XTX and replace it with today's top of the line.

Well, almost top of the line. For $350—or $100 more than what you'd have paid for a used X1950 XTX master card—we were able to get Nvidia's new GeForce 9800 GTX card. The card supports dual-link HDCP, uses the new G92 core, and, fortunately, does not require the newer 8-pin/6-pin power connectors. That means we can continue to use the 600-watt Thermaltake in the machine. However, we encountered another unexpected twist. The longer 9800 GTX board just barely fit into the midtower CyberPower case. If it had been even a few millimeters tighter, we would have had to buy a whole new case too. So before you upgrade your GPU, make sure your case can accommodate it.

We achieved performance gains of 92 percent in PCMark GPU and 72 percent in UT3, our two GPU-centric benchmarks. Not too shabby. And that's at normal resolutions. At 1920x1200 or 2560x1600, the 9800 GTX eats the X1950 XTX's lunch, dinner, and midnight snack.

CPU

The D975XBX motherboard isn't actually certified for quad-core support, but it runs fine with a Conroe quad. We reached for Intel's 2.4GHz Core 2 Quad Q6600 as a fairly inexpensive way to gain more performance. While tempting, making the jump to a $1,000 quad Core 2 Extreme seems, well, extreme for this box. Selling for $240 today and possibly even less by the time you read this, the Q6600 gives you the performance benefit of four cores. And in apps that scale with cores, such as most video encoders, a quad pays off. With something as simple as slide-show creation, we were able to cut a third of the time off the project's encode. If a job typically takes three hours, what would you pay to have an extra hour for playing games instead of twiddling your thumbs in front of your dual-core box?

HARD DRIVE AND SOUNDCARD

A 250GB drive doesn't cut the mustard anymore, so we dropped in the biggest, fastest drive around: Samsung's F1 terabyte drive. It doesn't hurt that the drive sells for as little as $250. Our second drop-in was a Creative Labs X-Fi XtremeGamer card. An $80 upgrade, this greatly improves the gaming audio experience on our machine.

At $350, the EVGA GeForce 9800 GTX is a hell of a deal and outperforms the original X1950 XTX card.

Call us fools, but we still like good audio in games, which you get in spades from Creative Labs's X-Fi XtremeGamer.

Don't believe you can use 1TB of hard drive space? Someone once said the same about 5MB of storage, buddy.

BENCHMARKS

CyberPower PC	$500 PC	Pre-Upgrade	Post-Upgrade	% Change
ProShow (sec)	2,528	1,594	**1,176**	36%
PCMark05 Overall	4,785	7,045	**8,110**	15%
PCMark05 CPU	4,635	6,819	**7,734**	13%
PCMark05 RAM	3,966	**5,477**	5,313	-3%
PCMark05 GPU	3,750	7,668	**14,691**	92%
PCMark05 HDD	**5,877**	5,280	5,228	-1%
UT3 Omicron Bot (fps)	18	61	**105**	72%

Best scores are bolded.

CASE STUDY 3

Alienware Athlon 64 3000+

Our upgrades put the spookiness back into this old Area 51 machine

We're pretty sure that three years ago somebody uncrated this Alienware Area 51 PC and was amazed by the rig's unearthly technology and out-of-this-world gaming performance. Today, it's about as special as a bucket of mud.

That's a sad comment on how far the Athlon 64 3000+ inside the Area 51 has fallen. Today, this Venice single-core Athlon 64 is probably best suited for web browsing and email. Don't believe us? In our ProShow Producer benchmark, the lowly Pentium 4 created our photo slide show in about an hour. It took the A64 3000+ almost two hours!

The rig's GPU, a GeForce 7900 GTX, is not the original videocard that came with the system, as the machine's other parts are vintage 2005 and the 7900 GTX came out the following year.

The Area 51 is an interesting upgrade challenge. It's the opposite of the Dell, which had a fairly serviceable CPU but a complete dog of a GPU. The Alienware has an almost useful GPU but a total dog of a CPU. The benchmark scores back this up. Against the new $500 rig, the poor Athlon 64 doesn't stand a chance. The Alienware PC is able to redeem itself only in the gaming tests, in which even the ancient 7900 GTX outstrips the budget 8500 GT.

So here's where it gets tricky. Our first instinct was to drop in a Socket 939 dual-core processor and a second GeForce 7900 GTX card. That gives you dual cores and SLI, man! But is that the right upgrade? Read on.

Our Alienware Upgrades

Remember our third rule of upgrading: Does it make sense? With the Alienware Area 51, it does and it doesn't.

CPU AND MOTHERBOARD

Upgrading the CPU was job one on the Alienware box. At first we figured, heck, let's just drop in a Socket 939 Athlon 64 X2 4800+ and call it a day. Then we looked at prices. On Pricewatch.com, the cheapest new 4800+ was $439. Even on eBay, 4800+ procs were moving for about $100. That's for a *used* processor. Our second option was that little darling the Opteron 185. A 2.6GHz dual-core 939 CPU, this chip works perfectly fine as a stand-in Socket 939 Athlon 64 dual core. Prices for this chip, however, are closer to $280. If we got a paper route and saved our money, we'd be better off buying a $500 bargain PC instead of buying this proc. Even with the Opteron 185 or 4800+, the box would still be a chump next to the Pentium E2160 in the $500 machine.

TOTAL UPGRADE COSTS: $1,197

That tipped the scales for us. The situation clearly called for a more thorough overhaul. Thanks to Alienware's use of industry-standard ATX parts, an extreme makeover was not only possibly but quite easy. We replaced the Athlon 64 3000+/Asus A8N32-SLI combination for a Core 2 Quad Q9300 and MSI P7N-SLI Platinum. Intel's $300 Q9300 is based on the new Penryn core and is the class leader of cheap CPUs. The $175 MSI P7N-SLI Platinum mobo uses nVidia's nForce 750i chipset and gives us the SLI option, as well. In a nutshell, we're talking budget SLI with full quad-core Penryn support. We, of course, recycled the 2GB of DDR in the box, but it's not like DDR2 is expensive today. In fact, it's even cheaper than DDR.

Thanks to our CPU/mobo upgrade, we went from a slide-show encode that took almost two hours to one that took 21 minutes.

That's a performance increase of more than 400 percent.

GPU

This one's easy, right? Just drop the original GeForce 7900 GTX into the upgraded Alienware, buy a second 7900 GTX, and SLI the two, right? Wrong. First, almost no one sells the GeForce 7900 GTX anymore and those who have them want beaucoup bucks. Newegg, for example, had an open-box MSI GeForce 7900 GTX card available—for $300. On eBay, prices for the cards ranged from $300 to $350. Holy GPU, Batman! Computer components are supposed to get cheaper as time goes by, aren't they? Not when you're talking about high-end parts, apparently. Still, isn't it better to pay for a second card rather than buy a single newer part? Not necessarily. Performance might be close in some situations, but generally, a single top-end modern card will outperform cards of an earlier generation, even if they run in SLI mode. What's more, SLI 7900 GTX still doesn't give you DX10. And from what we can tell, the drivers aren't a priority either.

Thus, for this upgrade, we decided to remove the 7900 GTX card and replace it with a brand-spanking-new GeForce 9800 GTX. While the 9800 GTX costs $350, we could probably sell our used 7900 GTX for $250 and end up paying just $100 for the GPU upgrade.

The switch certainly pays off. We went from 38 frames per second in Unreal Tournament 3 to 101fps, or the equivalent of a 166 percent increase in frame rates. That's at a standard 1280x1024 resolution, too. If we cranked the res up to 1920x1200, the gap between the 7900 GTX and 9800 GTX would be far wider, as the 7900 GTX would undoubtedly run out of steam while the 9800 GTX would keep sailing along.

HARD DRIVE AND SOUNDCARD

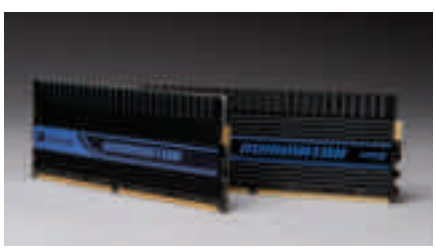
As with the CyberPower, we performed a couple upgrades on this rig mostly for livability. We added an F1 1TB Samsung hard drive to the machine as well as a Sound Blaster X-Fi XtremeGamer soundcard and called it a day.

BENCHMARKS

	$500 PC	Pre-Upgrade	Post-Upgrade	% Change
ProShow (sec)	2,528	6,745	**1,297**	420%
PCMark05 Overall	4,785	4,235	**8,786**	107%
PCMark05 CPU	4,635	2,643	**8,060**	205%
PCMark05 RAM	3,966	3,591	**5,684**	58%
PCMark05 GPU	3,750	7,731	**14,830**	92%
PCMark05 HDD	5,877	8,244	**8,250**	0%
UT3 Omicron Bot (fps)	18	38	**101**	166%

Best scores are bolded.

Nvidia's new GeForce 9800 GTX is the top single-core card in town today.



Corsair Dominator modules are pricey but give us low latency and full EPP support for our nForce board.

It didn't make fiscal sense to keep the Asus Socket 939 board, so we swapped it for an MSI nForce 750i SLI board.

JUST SAY NO

Some Upgrades Are Just Plain Stupid

Tempting as it might be to upgrade, it's not always prudent.

PENTIUM III: It's dead, Jim. Really. It's really, really, really dead. You could shoot a P3 onto the Genesis planet and the only possible result would be that you wasted a photon-torpedo casing. Just give up.

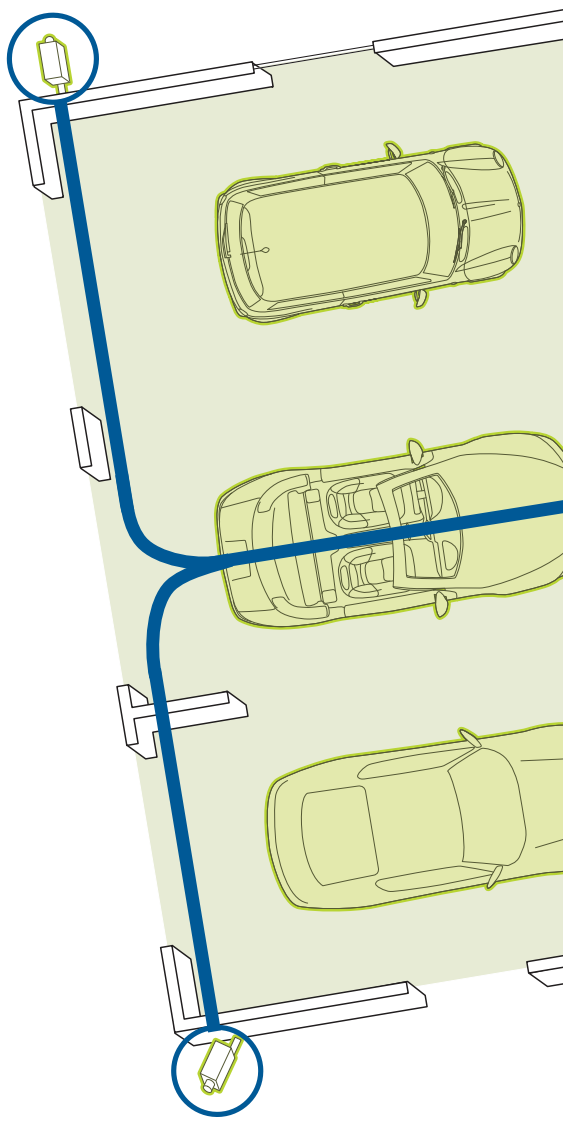
ATHLON XP: Instead of throwing good money into an Athlon XP box, just send us the cash. At least then *somebody* would be happy when all is said and done.

RAMBUS: There's a surprising number of Direct RDRAM boxes in service. If you have an RDRAM machine, don't even bother cracking it open. Unless you can afford to spend a million bucks on memory, you'll never see more than 1GB of RDRAM. RDRAM also limits you to a 533MHz FSB CPU, so there ain't no way you'll ever drop in that 3.4GHz Pentium 4 Extreme Edition.

THE DIGITAL

You've converted everything else in your life to digital, now it's time to literally bring technology home

BY MICHAEL BROWN



Yeah, we know. Home automation is the most overpromised, under-delivered technology of modern times, out-hyped only by cold fusion and the perpetual motion machine. But that situation is changing rapidly as two new home-control standards fight for dominance: the IEEE 802.15.4 standard popularly known as ZigBee and the proprietary Z-Wave standard developed and widely licensed by Zensys. Combine these with a PC, some software, a wired or wireless network, a few other gadgets, and a little elbow grease, and you can transform your home into a digital domicile Buck Rogers would be proud to inhabit.

Imagine a video-surveillance system that lets you view your house from anywhere you have Internet access or a home-monitoring system that alerts you to the presence of an intruder by sending a picture to your smartphone. Or the ability to program your garage door to turn on your interior lights when it opens—and turn them off when it closes. How about lights that dim when you press play on your DVD player?

We'll show you how to pull off these tricks and a lot more. We'll walk you through the steps of planning your own home-automation makeover, tell you what equipment you'll need to buy and how to install and program it, and share the lessons we've learned from first-hand experience. You'll find even more details at MaximumPC.com (http://tinyurl.com/2gys8o).

DOMICILE

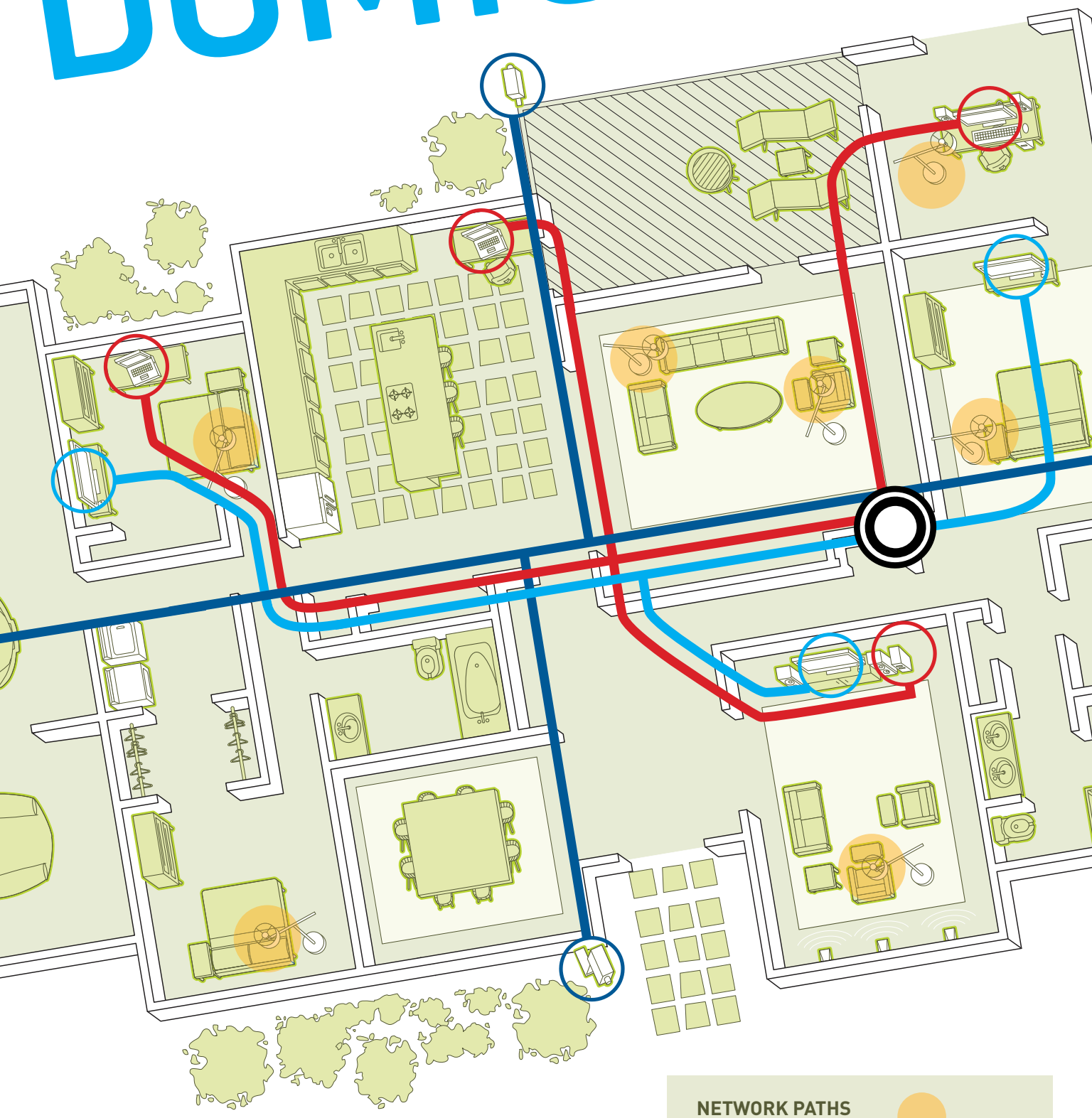


ILLUSTRATION BY CHRISTINA EMPEDOCLES

Planning Is Key

Observe the carpenter's maxim: Measure twice, cut once

You can build your home-automation system piecemeal and expand it as you have the inclination and budget, but we can't overemphasize the importance of spending some time to plan what you want to accomplish. A little forethought will save you a lot of time and a load of cash. Here's a broad overview of what's possible and how much you can expect to spend.

CHOOSE YOUR PROTOCOL

The most important decision you'll make is which home-automation protocol you'll use—at least for lighting control—because you don't want to take a mix-and-match approach. Although there are others, we're currently recommending that readers choose between these two wireless mesh network technologies: Z-Wave and ZigBee.

The advantage of a mesh network is that each device on the network is capable of receiving a command from any other device and responding to it. The response could be to activate a switch that sends power to a light or it could be to recognize that it's not the intended target, in which case it passes the command to the next device within range. This approach gives the network nearly unlimited range while consuming very little power.

Zensys manufactures Z-Wave chips and sells them to nearly every lighting-control manufacturer in the market, including Cooper, GE, Intermatic, and Leviton. This promiscuity has prevented any one licensee from dominating the market, which has in turn helped keep prices in check; it has also prevented the more open ZigBee standard from gaining a strong foothold.

We can close our entertainment center (and hide our cable mess) thanks to Logitech's Bluetooth-powered DiNovo Mini keyboard and Niles Audio's Remote Control Anywhere kit.

LIGHTING CONTROLS

When people think of home automation, managing their home's lighting via remote control is usually the first thing that comes to mind. Fortunately, this is the cheapest and easiest feature to implement on a small scale—and it's not much more difficult to set up on a large scale.

For those who just want to dip their toes in the water, plug-in modules are the easiest way to go. You simply plug a box into the wall, plug your lamp into the box, and program the remote control; you can then control the light using the remote (make sure the outlet cannot be shut off by a wall switch). The typical kit (with two modules and a remote) sells for about $100. Another $50 to $60 will buy a USB controller and basic PC software that allows you to manage your lighting system using your PC.

If you don't like the look of wall warts, you can replace your outlet with one that can be controlled via remote ($35 to $75), or you can replace the switch that controls that outlet (assuming there is one). Dimmers and switches cost between $35 and $75. You'll also need the remote, of course—those run from $35 to $150.

HOME MONITORING

Interested in keeping tabs on your house while you're away? Want to know if the kids got home from school OK or if the dog is tearing up your flower beds? Have you considered an alarm system but balked at the cost and the prospect of strangers monitoring *you*? Consider deploying a video-surveillance system or a home-monitoring package.

Price tags for such systems range from $250 for a basic kit to a couple thousand for an elaborate system capable of monitoring every square inch of your property. In addition to the cost of the equipment, most packages also carry a modest subscription fee for off-site video storage or sending alerts to your smartphone.

We can keep an eye on Maximum PC Lab North from anywhere we have Internet access, including our smartphone.

INFRASTRUCTURE ISSUES

We're assuming you already have a broadband Internet connection and a wireless router with at least a four-port switch. You might need to expand your network by stringing Ethernet cable, installing RJ45 jacks, and adding a second switch. We'll cover that in more depth in the next section.

If you intend to control your home-theater equipment with the same remote control you use for lighting, you'll need a remote that's compatible with both infrared (the technology used by most everything in your entertainment center) and RF (radio frequency, the technology used by everything else). If your A/V gear is hidden away in a closet, you'll also need an IR control kit. We like Niles Audio's RCA-HT Remote Control Anywhere kit for this; it's pricey at $270 but can be expanded to control everything from two different zones in your house (you'll find our review at http://tinyurl.com/39fr5g).

Build out Your Network

Make both wired and wireless infrastructure plans

Cameras and other devices described as "wireless" typically require electrical power. If there's not an electrical outlet near where you need to place the device, and you don't want to add one, consider buying a wired model and running Cat5e cable to that location instead. Plug a power-over-Ethernet (PoE) injector ($25) into your existing router or switch and put a PoE splitter ($40) at the other end of the cable.

Even at $65 per node, this approach will be cheaper than hiring an electrician—at least for small deployments. If you'll be setting up a lot of low-power devices, consider buying hardware (including a switch) that has PoE built in. If you have electrical power at all the desired locations but don't want to string Cat5e there, consider installing hardware that uses power-line networking.

Locate Your Home Run

The best way to build a network is to create a home run, a central location where all your Ethernet, telephone, and coaxial (for cable or satellite TV) cables originate—think of a bicycle wheel with spokes emerging from a central hub. Your broadband modem, router, and switch will also be located here. If you're retrofitting—as opposed to building a new home—you might wish to limit your home run to your data network.

Your home run should be accessible but out of sight—a closet or garage is a good choice. Install a cabinet, such as Leviton's Structured Media Center ($35 to $110, depending on size) to keep everything tidy.

Draw your home's floor plan and scout locations where you want to place Ethernet jacks (make sure there's a power outlet nearby, but avoid running Ethernet cable parallel to electrical cables—fish them down the opposite side of the stud). Use a stud finder to make sure there are no obstacles such as water pipes, in-wall insulation, or fire-beaks that will prevent you from pulling your cable. Explore your crawlspace or attic to ensure there's a clear path from the home run to each destination and then number these locations on your floor plan.

Here's an example of structured wiring, in which all the home's Ethernet, telephone, and coaxial cables (for satellite TV in this instance) are routed to a central location.

How to Install Ethernet Cable

STEP 1: CUT HOLES Use a mud ring instead of a junction box when installing low-voltage cable such as Cat5e. You'll still need to cut a hole in your drywall if you're retrofitting, but the mud ring makes it much easier to pull cable without crimping it (kinks in Ethernet cable will reduce the cable's data rate).

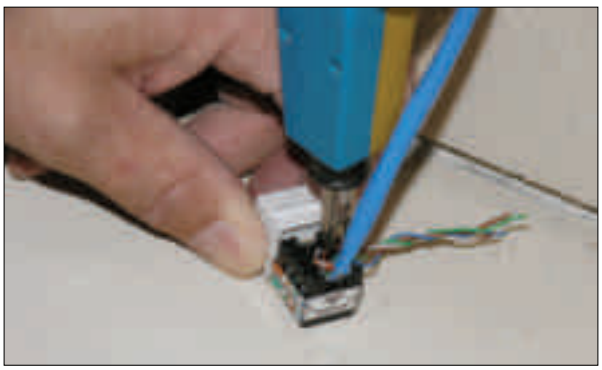
Place the mud ring against the wall and use a torpedo level to make sure it's straight. Using a pencil and the inside of the mud ring as a template, draw an outline on the wall. Place the tip of a drywall saw in the middle of the outline and hit the handle with the heel of your hand to punch a pilot hole. Carefully saw the drywall and remove the excess material. Place the mud ring inside the opening and flip the flanges out so they grasp the opposite side of the drywall; tighten them down with a screwdriver.

Next, drill holes from either the attic or the crawlspace between the same studs as your mud rings, as well as at the corresponding site of your home run. Using a spade bit, drill a two-inch hole in the footplate or ceiling joist. Drop fish tape through the hole, go back to the mud ring in the wall, and attach a length of wire to the fish tape. Go back to where you drilled the hole and pull the fish tape through—route this through your attic or crawlspace to the home run. Repeat this step for each run.

STEP 2: PULL CABLES Consider pre-cutting your Cat5e cable, so you can pull everything into your attic or crawlspace at once (give yourself plenty of slack; the cable is cheap, and you want to avoid redos). Go back to the home run and label the cables at each end. Bundle one end together with electrical tape, secure the bundle to the fish wire, and push it into the hole in the wall. Now go to your attic or crawlspace and pull the wire and cable through. Unbundle the cables and pull each one toward its destination according to your map and the number on the cable. Attach the fish wire there to the cable and drop it into the hole. Go back to each destination room and pull the wire to draw the cable through the mud ring. Take care to make gentle turns with the cable, don't bundle the cable too tightly, and make sure the cable doesn't chafe on any surfaces.

STEP 3: TERMINATE THE CABLE You'll need to terminate the Cat5e cable at each end. When you prepare the cable for termination, strip as little of the twisted-pair cable jacket away from the twisted pairs of wires as possible. Untwist the wire pairs and drape them over the snap-in jack (four on each side), following the color-coded T568A wiring diagram on the jack.

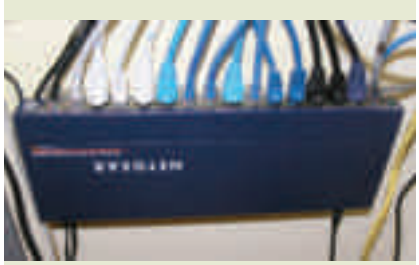
It's crucial that no more than a half-inch of the wire is untwisted—less is better. Use a punch-down tool to press each wire into place and trim off the excess. (Repeat this step at the home run, terminating the cable into a patch bay.) Maneuver the cable through the channel in the jack and lock it in place with the cover. Snap the jack into the back of the wall plate and mount the plate to the mud ring.



Install a Router and a Switch

A router is essential for sharing one broadband Internet connection among computers, and a switch joins multiple computers (or other devices, such as a media-streaming box or a gaming console) within a local area network. All modern routers have built-in switches, but they typically have only four ports. You can deploy multiple switches to expand your network as needed. If you have only one Ethernet jack in a room and need to connect two or more devices to the network from there, plug a multiport switch into that jack and instantly expand your network.

To set up your router, plug one end of a Cat5e cable into your broadband modem and the other end into the WAN port on your router. If you need more than the four ports on your router's switch, simply install a second switch by plugging it into one of the router's switch ports.



Netgear's GS116 switch delivers 16 gigabit Ethernet ports in a burly but silent enclosure.

Extend Your Network's Range

It's not always desirable—or even possible—to string Cat5e cable throughout your house, which is why Wi-Fi routers were invented. But distance and physical barriers (concrete walls, multiple floors, etc.) can prevent a remote client from connecting to your Wi-Fi network. One easy solution is to install a power-line network adapter.

As the name implies, a power-line network carries data on your home's existing electrical wiring. Plug one module into a power outlet near your router or switch and connect the two using Cat5e cable. Plug the second module into an electrical receptacle in the room where you need network access. In some kits, the second module functions as a wireless access point, but if you need to stream high-def video, you'll want a kit that hard-wires the second module to the streaming box.

You should be aware, however, that two standards bodies (the HomePlug Powerline Alliance and the Universal Powerline Association) are promoting different—and incompatible—power-line networking technologies. We've found products based on the latter technology—specifically, Netgear's HDXB101—to be faster for streaming media, but it looks as though the IEEE is about to adopt HomePlug.

LESSONS LEARNED

Hints from Hands-On Experience

- **Use Cat5e cable: It costs about the same as Cat5 and will enable your network to achieve gigabit speeds.**
- **When you drape the untwisted wires over the RJ45 block, twist the ends of the excess wire together. When you punch down and trim the wire, you'll need to pick up only two strands of waste instead of eight.**
- **If you buy a power-over-Ethernet power splitter, make sure it supports multiple voltages so it will work with a variety of devices. Trendnet's TPE-102S splitter, for example, can output 5, 7.5, 9, and 12 volts.**
- **If you place your networking gear in a closet, make sure there's adequate ventilation—especially if you're locating a server there.**
- **Make sure there's power close to your home run; you'll need it for your router and switch.**
- **Install a surge suppressor and consider an uninterruptible power supply if you're deploying a server.**
- **Industrial-quality switches and models with PoE typically have loud cooling fans; take this into account when locating your home run.**

Control Your Home's Lighting

There's more to it than dimming the lamp from your couch

Two automation standards are fighting for dominance: ZigBee and Z-Wave. We're focusing on Z-Wave here—despite the fact that it's not an IEEE standard—because it has the biggest presence in the market. But you needn't worry about owning an orphan technology should Z-Wave not stand the test of time. ZigBee's promoters tell us that designing and manufacturing a ZigBee-to-Z-Wave bridge would be trivial.

If you don't want to hire an electrician, the easiest way to set up a Z-Wave lighting network is to buy a kit consisting of plug-in modules and a remote control. Add a Z-Wave USB stick if you want to use your PC to control your lighting.

Install a Plug-In Module

If you can plug in a lamp, you can install a plug-in Z-Wave module. Simply unplug your lamp from the wall receptacle, plug the Z-Wave module into the receptacle, and plug the lamp into the module. You're done. We'll show you how to program the module in another step.

Before you buy a bunch of modules, however, make sure you select the right type. If you've replaced the incandescent light bulbs in your lamps with compact fluorescents, you'll need to buy an *appliance* module instead of a lamp module. Most appliance modules, such as Intermatic's HomeSettings HA02, will control any household appliance (such as a fan or television) up to 15 amps. Avoid plugging a module into a receptacle that's controlled by a switch because the module can't function if the switch shuts off its power source.

Plug-in Z-Wave modules don't look great, but they save you from futzing with bare electrical wires.

Install a Z-Wave Switch

STEP 1: REMOVE OLD SWITCH

We recommend hiring a qualified electrician for this step because a wiring mistake can cause serious injury or death. Even experienced do-it-yourselfers should proceed with extreme caution. Since we don't know how your house is wired, we can provide only general guidance.

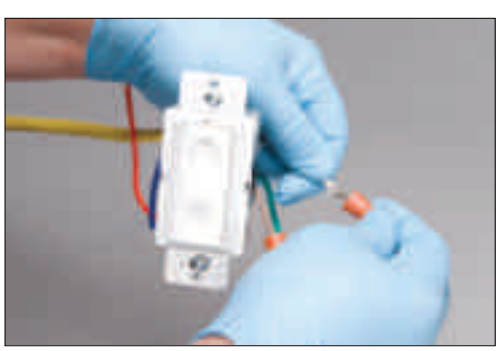
Turn off power to the existing switch by flipping the circuit breaker or removing the appropriate fuse. Put a sign on the fuse or breaker box warning no one else to turn it back on. Go back to the switch, remove the cover plate, and use a voltage tester to ensure that the circuit is cold.

Now, examine the existing wiring. Typically, a black wire is hot, white is neutral, and green or exposed copper wire is ground. We're setting up a single-pole application, meaning only this switch will control the load. The Intermatic InTouch CA3000 switch we're using can also function as a three-way or multi-way (the load can be controlled from two or more switches). Unscrew the wires from the old switch.

STEP 2: INSTALL NEW SWITCH

Connect the black wire inside the wall to the black wire on the switch by twisting the exposed wires together. Screw a wire nut onto the two wires and wrap it in electrical tape. Using the same technique, connect the blue wire on the switch to the wire connected to the load, and then repeat this process with the white and green wires. The switch's red wire won't be used, but screw a wire nut onto it so that it's not exposed.

Push the switch and its wires into the junction box and tighten down the screws. Turn the power back on and make sure that the switch turns the load on and off. Replace the cover plate and prepare to program the switch.



Program the Z-Wave Device

This process is pretty much the same whether you're programming a lamp module, an in-wall switch or dimmer, or any other Z-Wave device. Once you've installed all the Z-Wave switches, receptacles, and wall-mounted controllers you intend to deploy, use a compatible remote to establish a network. First, to ensure you're working with a clean slate, use the remote at each device: Press the Exclude button on the remote and then press the Activate button on the device.

Once you've done this with every device, go back and build your network one device at a time by pressing the Include button on the remote and the Activate button on the device. The InTouch CA5500 remote we're using in this example flashes a blue LED to inform you when an action is successful.

Because Intermatic's CA5500 remote control lacks an LCD, you have to guess what its single LED is trying to tell you.

Install and Configure Your Control Software

As much fun as it is to control lights and other devices using a remote control, you won't realize the full benefit of a home-automation system until you add software that will enable you to control the system with your PC. We use ControlThink's ThinkEssentials in this example because it's simple and inexpensive and comes with a USB Z-Wave adapter—all for $50.

Click the Home tab in ThinkEssentials and click the Draw Rooms button. Using the mouse, draw your home's floor plan. Once you've included all your Z-Wave devices in your master remote, you'll transfer the information about them to your PC via the USB adapter. Click ThinkEssentials's Advanced Settings tab and click Join Existing Network. Press the button on the remote that you use to include Z-Wave devices in the network.

When the data has been transferred, an icon representing each Z-Wave device will appear on your floor plan. If the icon is a question mark, click it to send it a command. The icon will then change to a plug (for a receptacle or switch), a light bulb (for a dimmer), or whatever is appropriate. Once you've determined which icons are linked to which devices, drag the icons into the appropriate rooms.

ThinkEssentials is great for getting your Z-Wave feet wet, but a more powerful option is HomeSeer's HS2 Home Control Software ($200).

LESSONS LEARNED

Tips for Working with Z-Wave

■ Before you buy a second Z-Wave remote control, make sure it can operate as a secondary remote. A Z-Wave network can have multiple secondary controllers but only one master. A master controller can include or remove devices from the network; secondary controllers cannot.

■ If you're setting up a large Z-Wave network, you'll want an assistant to help you identify which icons represent which devices. Ask that person to call out which lights and devices your mouse clicks are activating, so you can drag the icons to the appropriate rooms on your floor plan.

■ If no one's willing to help you sort out your Z-Wave devices, set up the network incrementally: Add just a couple of devices to the master remote at one time and transfer them to the PC as you go.

Ð Make sure your master controller is equipped with the most up-to-date firmware—just as you would keep your router up to date or your videocard equipped with the latest drivers.

■ Using ThinkEssentials ($50, www.controlthink.com/thinkessentials) and a remote-control program such as LogMeIn (free, www.logmein.com), you can control your home-automation system from anywhere you have Internet access.

Stream Your Media

Information yearns to be free, but music and video long to be everywhere

There's a lot of territory to cover here, but it boils down to this: Your media (music, video, digital photos, television programming, and so on) originates from location A, and you want to enjoy it at location B.

A media-center extender can stream any digital content from one room to another. If you don't have Windows Media Center, there are a host of products capable of streaming music, pre-recorded video, live or recorded TV, music, and digital photos from your PC. A wide variety of products can stream music from a PC, and a number of docking stations will do the same from an iPod. If you'd like to watch TV programming from a remote location or on your smartphone, you'll want a location-shifting device such as the Slingbox.

Choose a Server

We're using the term "server" rather loosely here. Traditionally, a server is a specialized PC that resides at the heart of a network and provides services to a number of connected client PCs. In a home-automation system, the server can be anything from your desktop PC, to a headless PC (meaning it has no display) running Windows Home Server, to a network-attached storage (NAS) box that's little more than a hard drive with some logic and a network address.

Using your primary desktop PC as a server is fine, as long as no one will be using it to run resource-intensive applications (such as games) while someone else is relying on it to stream music or video. Many people convert an old PC into a dedicated server when they upgrade to a new machine. A light-duty server doesn't need a fast CPU, and it certainly doesn't need the latest sound and videocard technology. You will, on the other hand, want to make sure it has a gigabit NIC.

We were initially impressed with consumer-oriented mini servers that run Microsoft's new Windows Home Server, such as the HP MediaSmart EX475 ($700) because they're small, quiet, and consume little power. A recently discovered data-corruption bug affecting multidrive servers, however, has cooled our enthusiasm. Microsoft says a fix will be available by June 2008, but we advise waiting for the dust to settle.

QNAP's TS-109 Pro is not only a fast NAS box, its feature set rivals that of a full-fledged server.

Choose a Media-Streaming Device

Choosing the right server is easy compared to finding the right tool for streaming music, video, and digital photographs—there are just so many options to choose from. Your first step is to decide what you want to stream and where you want to stream it.

A media-center extender, such as the Linksys $250 DMA2100 (or an Xbox 360), can do it all, but these devices require that the host PC be running a version of Windows that includes Windows Media Center. Unfortunately, the latest (and most capable) media-center extenders are not compatible with Windows XP. On the other hand, one of the few features that renders Vista superior to Windows XP is its ability to record and stream copy-protected content from your cable-TV system. But there's a major catch: You'll need a CableCARD tuner in your PC, and the only way to get one is as part of a new, prebuilt system. Satellite TV customers are entirely out of luck—there's no CableCARD equivalent for satellite. A/V streamers such as Netgear's EVA8000 ($350) or the PlayStation 3 ($400) can do most everything that a media-center extender can do—*except* stream encrypted television programming.

The most important aspects of a music-streaming system are audio quality, the remote control, the software for the host PC, support for third-party services (such as Rhapsody and Pandora), and capacity for building a multiroom system. Logitech's Squeezebox (from $300) and the Sonos Digital Music System (from $600) are tops in this category.

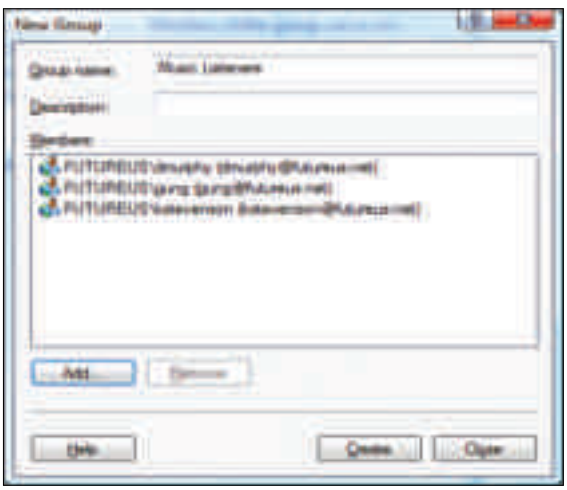
The Sonos Digital Music System is the best multizone music-streaming product we've encountered—well worth the $1,000 price tag for a two-room system.

Configure Your Media Library

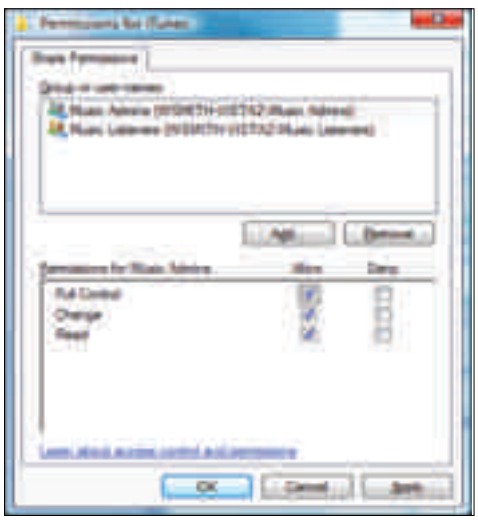
Once you've selected a server, you'll want to build a good directory structure on the rig that's not only easy to maintain and back up but also secure from accidental deletions and malware running on other machines on your network.

While you could put all your files in one giant folder and share that folder, it is much more effective to create individual shares for your music, movies, and photos. That way you can control your users' access levels based on the type of content in the shares. While everyone should have read access to photos, you may want only one or two people to be able to write to the photo folder.

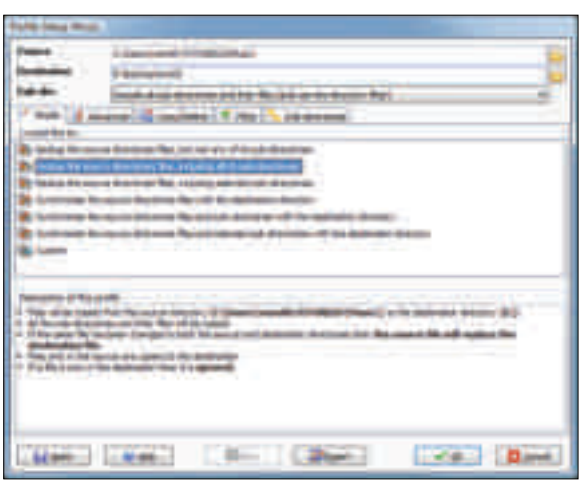
To access the advanced permissions dialogs, go into the Folder Options control panel, click the View tab, and uncheck "Use sharing wizard" in Vista or "Use simple file sharing" in XP.



1. CONFIGURE GROUPS: First, you need to create and populate groups with users. You should create groups based on tasks they'll perform—for example, Music Listeners and Music Admins—and then set permissions to allow the lowest level of access that your users will need to complete those tasks. Once you've decided who gets read access and who gets write access, go to Administrative Tools, Users & Groups to set up your groups.



2. ASSIGN PERMISSIONS TO FOLDERS: Once you've created your groups and filled them with users, you need to enable sharing and adjust the permissions on the folders you want to share. Right-click the folder you want to share and select the Sharing option. Vista users need to click Advanced Sharing and then Permissions. Add your groups and set the permissions you want to allow, removing the Everyone option.



3. BACK UP YOUR FOLDERS: Now repeat the same steps for your photo and video folders. Once that's done, you should set up a regular backup procedure for you media folders. Even though you've protected your photos, music, and movies from accidental erasure at the hands of family members, you still need to do regular backups. We recommend using SyncBack Freeware, which you can download at www.2brightsparks.com/downloads.html.

LESSONS LEARNED

Networking Tips and Tricks

- A full-blown PC operating as a server will consume much more power and generate a lot more noise than a NAS box.
- Don't forget to budget for speakers when planning a multiroom audio system.
- If you locate your server in an equipment closet, make sure there's adequate ventilation.
- You'll want an 802.11n Draft 2.0 wireless network to stream high-def video, but you might need a wired connection for best results.
- If you're mixing Vista and XP machines on the same network, make sure they all use the same workgroup name (the default is MSHOME on XP but WORKGROUP in Vista).

Home Monitoring and Surveillance

Protecting your most valuable assets: your home and its contents

In many respects, this aspect of home automation is even more important than lighting controls and media streaming; unfortunately, it's even less mature as a market. We'll help guide you through the wilderness.

In our mind, the ideal system would be capable of monitoring all our doors and windows, detecting motion inside the house, and controlling our irrigation system. It would also include sensors capable of detecting disasters such as fire or a burst water pipe, send alerts to our smartphone whenever an unexpected event occurs, and provide video coverage of the interior and perimeter of our home that we could access from the Internet.

No one package does *all* of those things, which means you'll need to mix and match solutions to get to home-automation nerdvana.

Four Solutions

The three best home-monitoring and surveillance packages we've encountered are Eaton's Home Heartbeat, iControl Network's iControl, and Logitech's WiLife. Your other alternative is to deploy a conventional Cat5 system, although this category is limited to video surveillance using webcams.

Home Heartbeat is a robust home-monitoring system that can alert you to the status of doors and windows (open or closed), power receptacles (on or off), and movement inside your house. A starter pack consisting of a base station, a key fob for receiving alerts (originating from your land line), and one open/closed sensor sells for $225. Add-on sensors cost $40 to $50 each. Home Heartbeat can also detect water leaks and automatically shut off the water supply using an optional controller and a custom ball valve. It uses the ZigBee wireless networking standard and can be controlled over the Internet (you'll need the $160 broadband gateway, and a subscription fee applies). But the system doesn't include cameras, so it can't show you what's happening inside or around your house.

IControl's advanced starter kit ($250) consists of a broadband interface, a wireless webcam, a lamp-control module, a motion sensor, a door/window sensor, and a remote control. It can be expanded with a host of accessories, including a thermostat, a smoke/heat detector, and a water sensor (although it doesn't provide any means of shutting the water off). The system uses the Z-Wave wireless protocol, so it can be incorporated into any Z-Wave network. A subscription fee applies.

Logitech's WiLife system is limited to video surveillance, but it comes with the most robust software we've seen in this segment. A starter kit with one camera costs $300; add-on cameras cost $230 (the system is limited to six). It uses power-line networking, which eliminates the need to string Cat5 cable, and the company offers both indoor and outdoor cameras with motion-activated recording capabilities. You can monitor the cameras from the Internet, but there's a subscription fee if you want email and cellphone alerts.

Set Up Your Security System

Place a motion sensor at tabletop height and it will detect an intruder's movement while ignoring any pets moving about the house. You'll quickly tune out—or turn off—a security system that constantly cries wolf.

Tucked behind a vase, iControl's battery-controlled motion sensor can operate unobtrusively.

Since you can't predict where a criminal will attempt to break into your house, it's best to place a sensor on every window and exterior door. Sensors typically consist of two blocks connected by a magnetic field. When the blocks are separated and the magnetic field is broken, the master controller sends an alert to your email address or to your cell phone via SMS. Sometimes, what *doesn't* happen is as important as what does. If you have latchkey kids, for instance, you might want to set up an alert to notify you if the front door doesn't open within a specific time window.

This Logitech WiLife camera keeps tabs on the front door. But consider all the other possible points of entry, as well.

Sensors can tell you only that motion has been detected or a door or window has been opened (and if the window is simply smashed, it might not even do that). Another line of defense is to deploy Internet-connected video cameras with motion detectors. We recommend placing an outdoor camera at each corner of your home to monitor its perimeter. A box-shaped house would require only four cameras, but a home with an unusual layout or one with recessed entry doors might require more. A web camera with a two-way intercom placed outside your front door or at your gate will allow you to communicate with a visitor without having to approach or open the door.

Configure a WiLife Camera System

We've been jazzed about WiLife's security camera system ever since we got our paws on its spy camera. The spy cam itself is dorky as all get-out, but its software is amazing.

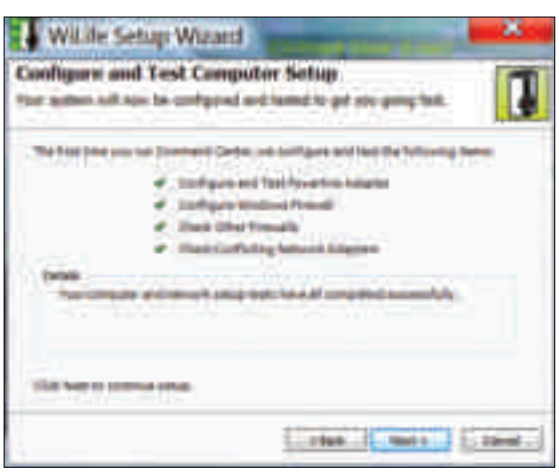
We're not big fans of power-line networking, but it works here because the benefits outweigh the drawbacks: All you need in order to deploy a camera is a nearby electrical outlet. The network's narrow bandwidth isn't a problem because you're not transmitting sound and the video isn't high resolution. You can outfit the indoor cameras with night vision or three different lenses, and the outdoor cameras don't need enclosures because they're completely weatherized.

You can view your cameras from any Internet connection. An optional subscription to WiLife Platinum ($80 per year) adds email and cellphone alerts, remote playback, and 50MB of online storage. Setting up the system is dead simple.

1. INSTALL YOUR CAMERAS AND PLUG THEM IN: First, install the WiLife software; then restart your computer. When you start the software for the first time, you'll be asked to set aside some disk space that the system will use for recording its video captures. You'll then be prompted to set up a remote-viewing account. The WiLife system will use your broadband Internet access to upload live video from your cameras, which you'll be able to view from anywhere. The installer software will then ask how many cameras are in your system and which type of USB adapter you're using.

2. PLACE YOUR CAMERAS AND PLUG THEM IN: Power-line networking can be finicky; we've learned from experience not to permanently mount a camera until we're sure it's going to work with the receptacle we're planning to use. The cameras won't work with Z-Wave receptacles, either, because those receptacles have built-in surge suppressors.

Once you've temporarily plugged your WiLife cameras into receptacles near where you'll be using them, go back to the PC and click Next to resume the setup process.

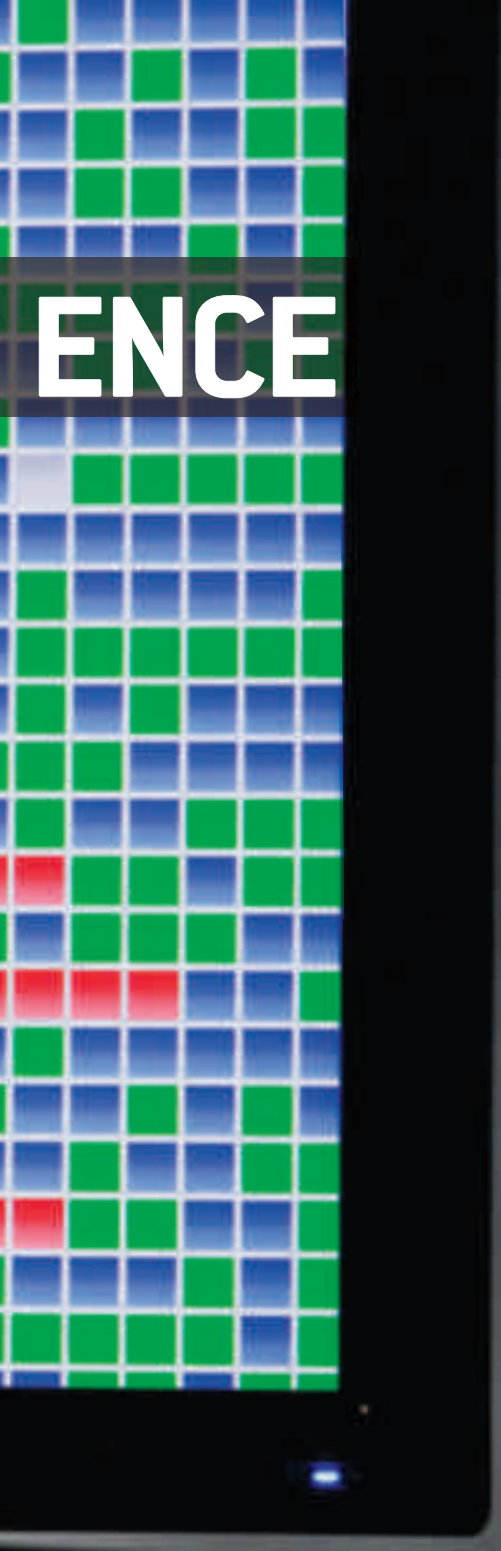


3. CONNECT THE POWER-LINE USB ADAPTER: Next, plug the power-line adapter into an electrical socket near your PC. The adapter has its own built-in surge suppressor and will not function properly if it's plugged into a second suppressor (don't use an extension cord, either). Plug one end of a USB cable into the power-line adapter and the other into your PC's USB port (do not use a USB hub). When you click Next, the software will find your cameras and configure your network. The adapter will grab the WMV video that the cameras are running through the power-line network and display it using WiLife's user interface.

4. NAME YOUR CAMERAS: If the software was able to locate all of your cameras, it will provide thumbnail screens for each one and ask you to provide a descriptive name for each one. This way, you'll know which camera is having problems even if you can't see the video. If the software cannot find one of your cameras, reset the camera by unplugging it and plugging it in again or by using a paperclip to reset the camera to its default settings. If the software still can't find the camera, you'll need to move it to a different power outlet and try again.

THE DISK DEFRAG DIFFER

HAND MODEL: ALDO



ENCE

How does Vista's built-in defrag tool compare to third-party solutions? BY DAVID MURPHY

In a perfect world, the data on your hard drive would line up on the platters like little soldiers, all in perfect rows and grouped by class, frequency of use, and size. But modern-day Windows operating systems don't behave in such a way, leading to data fragmentation—and, by necessity, the rise of defragmentation routines.

As for how this happens, we'll offer a simplified version of a typical file-system architecture. Envision a blank drive. When an operating system writes a series of files to the drive, it might place them in sequential order—say, five different chunks of data lined up one after the other with each chunk taking up 20 blocks of space. Removing one of the files creates a hole that the operating system can then fill either completely or partially with new information.

Now suppose the new file needs to get bigger. Since the existing data takes up space immediately following the file that needs to grow, the operating system is forced to continue the file elsewhere on the drive. Take the large number of files on a typical hard drive and the massive number of writes and deletions that happen constantly and you get a perfect storm of file fragmentation.

Fragmentation forces the drive head to jump all over the place to find the bits and pieces of files whenever you access them. Defragmentation, then, is the means by which these files are realigned into contiguous chunks. Windows Vista does this automatically, only the slow speed at which it defrags makes us wonder: Is the time spent worth the supposed performance payoff? And do third-party defragmenters, free or otherwise, do a better job?

PHOTOGRAPHY BY MARK MADEO

Designing the Experiment

Fragmenting a hard drive is harder than you think, thanks to Windows Vista

THE SYSTEM

For our tests, we're using an HP TouchSmart IQ770 Desktop machine that has been in constant service as a security-monitoring webcam workstation for the last several months. Due to the amount of use (and abuse) this poor 1.6GHz AMD Turion-based machine has endured, we expected it to be fragmented beyond belief. And it would have been, were it not for the fact that Vista's automatic defragmentation utility is scheduled to run every week.

Unlike Windows XP, which uses a stripped-down version of Diskeeper to defrag drives, the Windows Vista application has been redesigned from the ground up. Microsoft claims that the new defragger makes for faster, less processor-intensive defragmentation. While it's true that the Vista defragger doesn't hit our system as hard as the XP defrag process, it takes much, much longer to complete, making Microsoft's claim of faster performance baffling.

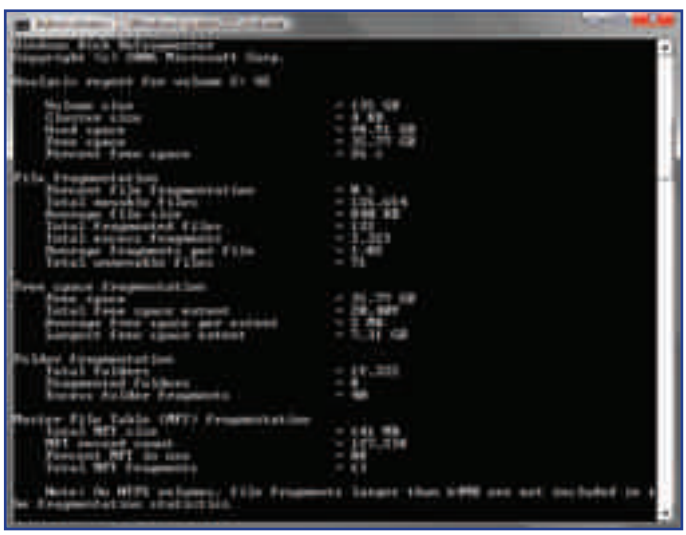
Because Vista's defragger runs automatically every week, it would be extremely unusual to find a heavily fragmented Vista drive in the real world. That said, prior to testing, we disabled Vista's defragger, uninstalled a few apps, and then filled the empty space with a collection of MP3s and other newly installed applications to replicate a busy week for a power user.

THE DEFRAGGERS

We've chosen four products for this challenge, starting with Vista's built-in defragmentation program. Against that, we're testing the free Auslogics Disk Defrag, as well as two commercial defragging utilities: Raxco's PerfectDisk 2008 and Diskeeper 2008. This healthy mix of free and paid-for defragmentation software will allow us to determine if there is any benefit to using a third-party defragger, and if so, just how much the commercial apps can improve our rig's performance.

THE BENCHMARKS

So that each defrag utility operates on an identical machine, we captured a complete image of the original drive using Norton Ghost 12 and then reloaded it onto the machine prior to running each program. To measure the performance impact of each utility, we looked at the machine's startup times, shutdown times, and PCMark Vantage scores before and after the defrag. We chose Vantage as our primary benchmark because it represents a number of real-world performance scenarios one would encounter during an extended period of computer use. We also factored in the time each utility took to perform its defrag to test our theory that Vista's defragger—low priority though it may be—still takes an inordinate length of time to complete.



The command-line version of Vista's defragger provides much more information than the GUI version.

Prior to making the Ghost image of our drive, we ran PCMark Vantage's hard drive performance script 20 times. Since typical defragmentation programs reorder data based on frequency of use, we wanted to make sure they take our benchmark into account.

Vista's built-in defrag program reported a fragmentation level of 11 percent prior to the defragmentation process. We were able to obtain this information only by using the command-line version of the app—the standard interface doesn't provide any information about your drive's state, nor does it report on the defragmenter's progress. It took Vista's app three and a half hours to defrag our test drive. Vista's lengthy defrag times are due largely to the fact that it runs as a low-priority process. The application won't make full use of your processor unless the computer sits idle for several minutes.

While the program reportedly reduced fragmentation on our drive to zero percent, we saw negligible performance gains in our PCMark Vantage tests. The startup time improved by 39 seconds, but the process added an additional 14 seconds to our shutdown time. Regardless of whether the culprit is our slow test rig, Vista itself, or the insignificance of drive fragmentation on performance, Vista's built-in defragmentation application did little to improve the real-world performance of our computer.

HP's TouchSmart IQ770 Desktop isn't the speediest of rigs, which forced us to measure our defragmentation runs in hours rather than minutes.

BENCHMARKS

	Fragmented Vista Drive	Windows Vista Defrag
PCMark Overall	3,114	**3,162**
Startup (sec)	172	**133**
Shutdown (sec)	**20**	34

Best scores are bolded.

Auslogics Disk Defrag

It's free and fast but doesn't improve system performance

Auslogics's Disk Defrag (free, www.auslogics.com) is a no-frills entry point into the world of defragmentation. It offers just what the name implies: a disk defragger, plain and simple. From a drop-down menu you select the drive you want to defrag and then press a button to start the procedure. (An upcoming version of the app will reportedly feature a scheduler, as well.)

We love the program's graphical analysis of the drive's fragmentation level—it's interesting to see what's being done to your computer (which allows you to estimate how long the procedure will take). Disk Defrag doesn't come with a pre-defragmentation analysis tool, though a results screen following the defrag shows what the program "improved"; still, it wasn't clear to us in our benchmarking that Disk Defrag actually did anything.

The program quoted an initial fragmentation level of 4.21 percent, the lowest figure of the four programs we tested. That said, Disk Defrag still took two hours, 45 minutes to complete its run on our drive. Our test rig's shutdown time improved by three seconds compared to the shutdown time after a Vista defrag (although it was still slower than pre-defrag), but this was offset by a dramatic 45-second increase in our startup time.

Stranger still, we saw a 5 percent drop in performance as measured by our PCMark Vantage benchmark. There were no noticeable negative effects during normal usage, but we didn't see a benefit from running the defragmentation either. The only true positive this program offers is speed—it completed the defrag process 45 minutes faster than the built-in Vista client.

Auslogics's Disk Defrag skimps on features, but it still offers more than Vista's native defragmentation client—including a graphical interface.

BENCHMARKS

	Fragmented Vista Drive	Windows Vista Defrag	Auslogics Disk Defrag
PCMark Overall	3,114	**3,162**	2,979
Startup (sec)	172	**133**	176
Shutdown (sec)	**20**	34	31

Best scores are bolded.

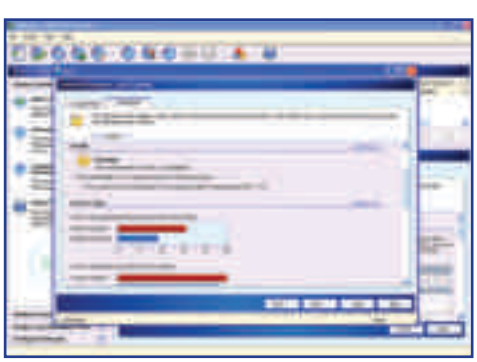
Diskeeper 2008

For all its options, Diskeeper did nothing to increase our rig's performance

Diskeeper 2008 ($30, www.diskeeper.com) comes with a few features that are above and beyond anything you'll find in a free defragmentation application. For starters, the utility's built-in automatic defragmentation option negates the need to ever run a manual defragmentation of any sort. The program makes full use of underused resources on your computer by defragmenting your drive in the background. You can let the program figure out your typical computer use and run accordingly or dictate when you want the full use of your processing capabilities.

Since Diskeeper runs inside the operating system, it includes a boot-time defragmentation option which manipulates files that would otherwise be locked by Vista. The program will even lock off your master file tables and paging files to prevent any future fragmentation, a feature unique to Diskeeper. Considering these would be handled by a boot-time defragmentation, it's nice to see the program making even its *own* workload easier.

Diskeeper reported a fragmentation level of 14 percent on our test drive, the highest of any program we tested. Of the third-party programs, Diskeeper took the longest to finish its defragmentation routine, but at two hours, 48 minutes it still took less time than Vista's built-in program. However, we saw no improvement whatsoever in Vista's startup or shutdown times. In fact, it took an additional minute for the computer to boot compared to boot times after Vista's defragger ran. Our PCMark Vantage test showed a negligible loss of performance, and we didn't' see any differences in speeds when running common Vista-based tasks.



Diskeeper's drive analysis provides plenty of information about the fragmented status of your drive, but no estimate of how long the defragmentation will take.

BENCHMARKS

	Fragmented Vista Drive	Windows Vista Defrag	Diskeeper 2008 Defrag
PCMark Overall	3,114	**3,162**	3,102
Startup (sec)	172	**133**	186
Shutdown (sec)	**20**	34	36

Best scores are bolded.

PerfectDisk 2008

PerfectDisk defrags the fastest, but fails in the subsequent benchmarks

PerfectDisk 2008 ($40, www.raxco.com) sports a similar feature set to Diskeeper 2008. In fact, the programs are nearly identical in basic functionality. But PerfectDisk does tweak a few of our favorite features just a bit. For example, PerfectDisk, like Diskeeper, allows you to establish an automatic defragmentation that runs whenever your computer is idle; however, it also lets you tie defragmentation runs to your screensaver. When your screensaver starts, PerfectDisk starts. We like this additional flexibility and would welcome even further customization in future editions of the software.

For the time conscious, PerfectDisk 2008 does a great job of estimating exactly how long the defragmentation process will take and provides approximate CPU usage info and fragmentation level at the beginning and end of the run. After a thorough analysis of your drive, the program suggests ways to improve performance. In our case, we needed a boot-time defragmentation. But we couldn't select it from a menu—we had to run the analysis first, which then gave us that option.

The program reported that our test drive was 7.5-percent fragmented. Following a two hour, 24 minute defragmentation, our startup times increased by approximately 40 seconds compared to the startup times following Vista's defragmentation and increased by two seconds when compared to the fragmented drive. PerfectDisk was the only defragger that improved our original shutdown time, albeit by just four seconds. But it also netted us a minor loss of performance in the PCMark Vantage benchmark—a decrease of 6 percent over the measured performance following a defragmentation by Vista's built-in application.

You won't see all of PerfectDisk's available defragmentation options unless you first run an analysis of the drive.

BENCHMARKS

	Fragmented Vista Drive	Windows Vista Defrag	PerfectDisk 2008 Defrag
PCMark Overall	3,114	**3,162**	2,952
Startup (sec)	172	**133**	170
Shutdown (sec)	20	34	**16**

Best scores are bolded.

Don't Waste Your Money or Time!

You shouldn't break the bank for negligible performance gains

With all of the benchmarking completed, we find it rather suspicious that disk defragmentation did nothing to improve the performance of our machine. However, we must note that our test drive was not terribly fragmented to begin with due to Vista's auto-defragger running on our test bed. Even the paid-for programs were unable to yield any positive gains—quite the opposite, in some instances.

We had high hopes for Diskeeper at first. Given the relatively high level of fragmentation it quoted compared to Vista's built-in app, we assumed the program's analysis routines were seeing fragmentation that Vista couldn't. In turn, we expected Diskeeper to do a better job of moving files around and ultimately give us better benchmark numbers than the Vista client.

That was wishful thinking on our part, as Diskeeper didn't trump the Vista defragmentation routine at all. While it did beat PerfectDisk by 150 points in our PCMark Vantage test, we hardly consider this a trouncing. We even fired up both programs' boot-time defragmentation options to see if these additional features would make any difference on our benchmarks. Zilch.

We like the Vista defragmentation program for the simple fact that it's, well, there. It comes with Vista and is enabled by default and runs its defragmentation routines during the wee hours of the morning. And even if you alter this time or run your own manual defragmentation, the program runs at a low processor priority, so you can easily multitask without hampering your computing experience.

That said, we hate that Vista gives you no estimated time of completion. You also get no way to see what the application is doing, any graphical representation of how fragmented your drive is, or any of the other features we've come to expect in even the most entry-level of defragmentation applications. Even if the pretty moving colored blocks don't correspond to the actual data on our drives, at least they give us something to look at during the interminable two-hour-plus defrag process. You even have to run a command-line version of the application just to see an analysis of your drive's fragmentation level.

If you don't mind manually running your defragger and you can't live without a visual representation of the fragmentation level of your drive, try Auslogics's Disk Defrag. It doesn't outperform Vista in our tests, but it runs faster than the operating system's built-in defragger, and it displays a pretty picture to let you know that it's working. Even if disk defragmentation ultimately does nothing for your computer—as our benchmark numbers would have us believe—you don't need to spend money on a third-party program when Auslogics's Disk Defrag is a serviceable free solution.

WHITE PAPER

Radio Frequency Identification

RFID: modern marvel or an easy way for Big Brother to keep tabs on us? —GORD GOBLE

The UPC (Universal Product Code) revolutionized inventory management. Wave a scanner in front of a bar-coded item and details about it can be displayed instantly. RFID (Radio Frequency Identification) performs a similar function; however, it can not only store exponentially more data than a UPC but also be updated with new information.

An RFID system has three components: a microchip for storing data, an integrated antenna (the chip and antenna are collectively known as an RFID transponder or RFID tag), and a reader that retrieves the information stored on the microchip over a wireless connection.

The reader converts the radio waves reflected back from the RFID tag on the unlicensed 2.4GHz frequency band, using a protocol based on the IEEE 802.15.4 standard (the same standard ZigBee home-automation technology is based on). This digital information can then be passed from the reader to a computer.

Most RFID tags are passive, meaning they have no onboard power. They become operable only in the presence of a reader, drawing power from the RF energy field the reader creates while it's within range. Since they don't require batteries, passive tags can be extremely small and have a nearly unlimited lifespan. They're also extremely inexpensive, costing less than 10 cents each when purchased in lots of a million.

An active RFID tag is battery powered and therefore offers considerably more range. These devices can be activated by a low-level radio frequency and generate a high-level signal in response. Active RFID tags are used in the transponders that commuters install in their vehicles to automatically pay bridge fares and turnpike tolls as they pass through a tollbooth.

Both versions of the technology are being used for asset and inventory tracking, automated payment systems, military and commercial container shipments, retail shelf stocking, automobile and building locks, and much more. Proponents see a future in which you'll go to the gym, flash a tag, and automatically engage in a personalized, fully guided exercise regimen. Soon, RFID may be in your credit cards and embedded in your cash, too. And the technology isn't reserved merely for inanimate objects. There's a good chance you've eaten a steak from a steer whose life path from the ranch to the meat-packing plant was tracked by an RFID tag attached to its ear.

Unlike a barcode, the data stored inside an RFID tag can be rewritten, and the chips inside the tag can store as much as 2KB of data—a staggering amount of information compared to the 10B to 20B that a barcode can harbor.

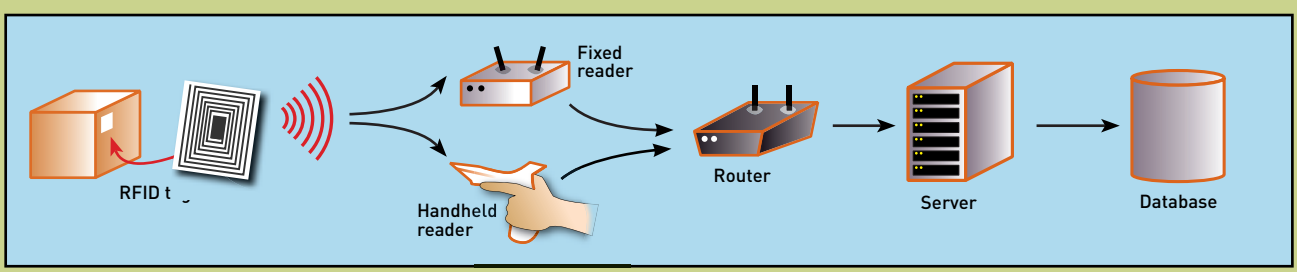
IMAGINE HOW MUCH ADVERTISERS WOULD PAY FOR ADS THAT COULD BE AIMED SPECIFICALLY AT YOU....

WE'RE READING YOU READING US

The consumer-research firm Mediamark Research and Intelligence (MRI) is experimenting with RFID to measure how long readers linger on the pages of a magazine. Since it would be impossible to embed a tag in every page of every magazine, MRI is using electromagnetic sensors and patches paired with conductive ink on the covers and key pages of a sampling of magazines. The magazines are then inserted into semi-rigid plastic jackets, with active RFIDs attached to the rear covers. The magazines

HOW IT WORKS

Inventory Tracking via RFID



In a retail inventory management system, RFID tags pla erchandise are picked up by stationary or handheld readers. Details about the goods are then transferred via router to a database running on a central server.

used for this study were then placed in waiting rooms throughout New York City. (Don't worry, *Maximum PC* was *not* part of this study.)

The RFID has an internal clock that can measure how long each of the key pages, and the magazine as a whole, remains open. As the patch comes into contact with the sensor (when the page is turned or the entire magazine is closed), the RFID records that page number and the total time it was open. An RFID reader inside the waiting room will later establish a wireless connection with the RFID tag, retrieve the information stored within it, and transfer it to a PC.

I SPY

If the prospect of someone monitoring how much time you spend reading a magazine creeps you out, imagine having an RFID transponder embedded in your body. The U.S. Food and Drug Administration approved such an application—the Applied Digital Solutions's VeriChip—in 2004. The VeriChip contains a 16-digit number that correlates to information stored in a central database and is used to identify an individual.

But with its vast capacity, an RFID device inside you could store not just your name and address, but everything from your marital status to your ethnicity, height and weight, hair and eye color, blood type, and health status—even what model car you drive.

Google rakes in billions of dollars in revenue by displaying ads targeted to your search queries. Imagine how much advertisers would pay for ads that could be aimed specifically at you—á la *Minority Report*—taking all of your personal information into account to craft the ultimate custom message.

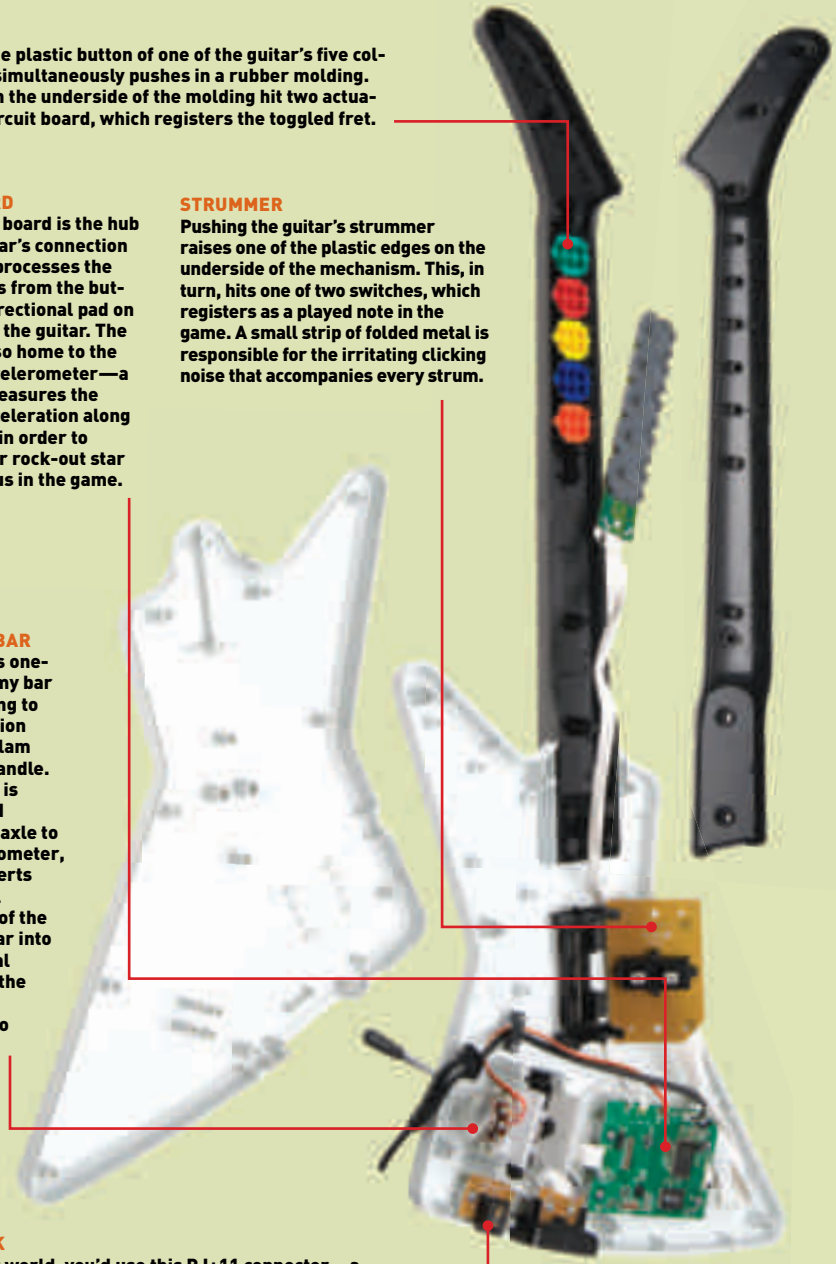
Take the sci-fi element out of the equation and there's still reason to worry about RFID technology endangering privacy rights. The Electronic Frontier Foundation (EFF) is spearheading several anti-RFID initiatives, including one to prevent school districts from tracking students using RFID.

"We're not against RFID as a whole," says EFF senior staff attorney Lee Tien. "I have RFID-controlled car locks, and it's great. We're concerned that RFID technology is promiscuous and persistent. Tags can contain personal information such as credit card numbers and addresses, often unencrypted, which can be read by any compatible reader. There's no challenge-response authentication. It's not necessarily government or big business—it's the fact that you'll be exposed to this level of scrutiny."

Such efforts are unlikely to stop the proliferation of RFID, but they will help raise public awareness—and that should prevent the most egregious abuses of the technology.

X-plorer Guitar

We didn't bash it against a stage, but we are disassembling the standard controller for Aspyr's Guitar Hero 3 PC game to see how plastic parts translate to onscreen shredding



FRETS
Pressing the plastic button of one of the guitar's five colored frets simultaneously pushes in a rubber molding. Two dots on the underside of the molding hit two actuators on a circuit board, which registers the toggled fret.

MAINBOARD
This circuit board is the hub for the guitar's connection options. It processes the instructions from the buttons and directional pad on the front of the guitar. The board is also home to the guitar's accelerometer—a chip that measures the guitar's acceleration along three axes in order to trigger your rock-out star power bonus in the game.

STRUMMER
Pushing the guitar's strummer raises one of the plastic edges on the underside of the mechanism. This, in turn, hits one of two switches, which registers as a played note in the game. A small strip of folded metal is responsible for the irritating clicking noise that accompanies every strum.

WHAMMY BAR
The guitar's one-way whammy bar uses a spring to create tension when you slam down the handle. The motion is transferred through an axle to the potentiometer, which converts mechanical movement of the whammy bar into an electrical signal that the controller passes on to your game.

RJ-11 JACK
In a perfect world, you'd use this RJ+11 connector—a phone-cord jack—to attach effects pedals to the guitar. Red Octane, though, has yet to release, let alone announce, any hardware expansions for its guitars.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Create a Custom Internet Radio Station

Why listen to commercial streaming radio at work when you can stream tunes from your collection at home? —WILL SMITH

TIME = 42 MIN

WHAT YOU NEED

- **TWO PCs**
- **SQUEEZECENTER SOFTWARE**
  Free, www.slimdevices.com
- **A DYNDNS ACCOUNT**
  Free, www.dyndns.com
- **DYNDNS UPDATER**
  Free, www.dyndns.com
- **AWESOME MUSIC**

Your IT department won't let you copy MP3s onto your work PC, and your iPod won't hold your massive music collection, but you need to listen to tunes while you toil away at the day's labor. What's an audiophile to do? The answer is simple: Stream the collection you have stored on your rig at home to your PC at work.

Sure, you could fire up a streaming service such as Pandora, Last.fm, or any one of the thousands of radio stations that simulcast their programming on the Internet, but then you'd have to either listen to a fairly random playlist based on your typical listening habits or to someone else's playlist instead of your own. It can be fun to hear new tracks and find new artists, until you get stuck with a band you just hate—like Linkin Park. Sometimes you just want to fire up a favorite album and listen to the whole thing from start to finish. That's where your own personal streaming station comes into play.

It's easy to build a private streaming radio station that you can connect to from anywhere on the net using free software and services. We wouldn't suggest deleting your Pandora account and *just* jamming to your private station, but personalized web radio is a great alternative for days when other streaming services just don't cut it.

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

INSTALL SQUEEZECENTER

1 The secret sauce in our streaming scheme is SqueezeCenter, the open-source software that powers the Squeezebox. Formerly known as SlimServer, SqueezeCenter extends beyond the basic chores you'd expect from streaming-box software. For starters, it works with more than just the Squeezebox—you can stream your music to any PC with a copy of WinAmp, iTunes, or Windows Media Player installed. The application serves as an impressive web-based music jukebox that you can use to navigate your library and play virtually any DRM-free music format ever created.

QUICK TIP

SqueezeCenter will look for album art in both folder.jpg files and inside the ID3 tags themselves. You can easily update your music's album art using iTunes's Get Album Art feature or the excellent Album Art Downloader utility (http://sourceforge.net/projects/album-art).

The first order of business is to select the rig to install SqueezeCenter on. Remember that it will need to run 24/7, so you probably don't want to use your monster gaming rig for a server—unless you enjoy paying $300 a month for electricity. We recommend an older laptop or another rig that sips power.

Once that's decided, download and install SqueezeCenter. The installer will prompt you for the location of your music files and playlists, and then it will scan your library for supported music files, including MP3, FLAC, M4A, OGG, and WMA files. The scanning process can take a long time, especially if you have a massive collection, so now would be a great time to step away from the PC and go for a walk.

CONFIGURE SQUEEZECENTER

2 Before you can stream, you need to configure SqueezeCenter to accept connections from other PCs. The software allows password-free access to the web interface by default, but only from the computer it's installed on. We have to change that.

Open your web browser and connect to http://127.0.0.1:9000**.** Then click the Settings button in the lower-right corner of the interface and select the Advanced tab. Pull down the menu and select the Security tab. You'll want to enable password protection and set up a username and password for access.

Next, you need to configure the allowed IP addresses. It's a good idea to give the PCs on your home network access to the SqueezeCenter interface so you can change playlists remotely. To determine the IP addresses that get access to SqueezeCenter, you need to find out what IP range your home network uses. The easiest way to find your IP on XP or Vista is to open a command line (Start > Run > cmd.exe) and type `ipconfig`. You should see a list of your active network connections, but most home users will see one IP address. To enable access to other computers, you need to tell SqueezeCenter which IP addresses are safe by using a wildcard. Take your IP address and replace the numbers following the final period with an * and put that number into SqueezeCenter's Allowed IP Addresses field. Then click Apply.

CONFIGURE YOUR ROUTER

3 At this point, SqueezeCenter should be properly configured to work on your internal network, but machines outside the loving embrace of your router won't be able to access the web interface or the convenient streaming file. To enable external access, you'll need to open up your router's configuration interface and configure port forwarding for the ports SqueezeCenter uses.

Your router's IP address will usually be the same as the default gateway that ipconfig displays. Type that address into your web browser and log into the router using the password you created when you first configured your router. Next, you'll need to look for a section labeled Port or Application Forwarding. It's usually in the Advanced section of the router's control panel. If your router lets you specify port forwarding based on a rig's name that will update as your computer's IP address changes, you can simply specify the rig that will be used for streaming, set it to forward incoming TCP traffic to port 9000 on the server rig, and save your settings.

If your router doesn't let you specify port forwarding by rig name, you'll need to configure your server's IP address manually. Open your Network control panel, right-click your network connection's icon, and select Properties. Double-click TCP/IP and you can manually specify the IP address, Subnet Mask, Default Gateway, and DNS server info. Your default gateway is the same IP as your router and the subnet mask is usually 255.255.255.0. You'll need to pick an IP for yourself; most routers reserve the range from x.x.x.2-x.x.x.99 for static IPs. You can choose any unused number in that range. You should be able to get your DNS server info from the WAN or Internet setup section in your router's control panel. Once you've set up a static IP, go back to your router's forwarding menu and forward the appropriate ports to your new address.

SET UP DYNDNS

4 You should now be able to connect to SqueezeCenter from outside your home network, but only if you know your external IP address, which your provider can dynamically change from time to time. We're going to use the free DynDNS service to automatically forward traffic from a custom URL to our home network—the program updates the IP address every time your provider changes it. Before you proceed, you'll need to set up a free account at www.dyndns.com.

Once you've activated your account, log into the site and go to My Account. Then click the Add Host Services link and select a hostname and URL. We went with radiowill.kicks-ass.net. Input the IP address currently assigned by your ISP (which you can get from www.whatismyip.com). Be sure to save your settings!

INSTALL THE DYNDNS UPDATER

5 Next, you need to download the DynDNS Updater, which you can download from www.dyndns.com, as well. Install it on your server machine and follow the prompts. It will ask you for your DynDNS username and password and then ask you which of your DynDNS domains you want forwarded. Make sure you check the Enable Automatic Updates option; we recommend you run the Updater as a service, which will force it to start when Windows starts whether a user is logged in or not.

That's it! To listen to your stream, open your favorite MP3 player and go to the Open Stream option (the shortcut is Ctrl+U in both iTunes and Windows Media Player). The URL you'll use is http://yourcustomdomaingoeshere:9000/. Once you've connected to the stream, open the SqueezeCenter interface in your web browser using the same URL. Then you can select the tracks you want to listen to and rock out!

BROADEN YOUR BROADCAST

Stream to Your Pals—Legally!

Now your stream is set up, but your friends want in on the Internet radio action. Unfortunately, copyright law doesn't allow you to legally stream your tunes to anyone but yourself. If you want to stream to others, you can—but you have to pay. To get a license to broadcast, go to www.ascap.com/weblicense/. If you're choosing songs for your friends yourself and not running ads, you're eligible to use Schedule A of the Non-Interactive 5.0 ASCAP license, which costs $288 a year. Or you could just tell them to make their own station.

This month the Doctor tackles...

Disappearing Drives
Connectors
Copy Protection Problems

Screwed-up USB Storage

I have a Maxtor 500GB OneTouch 4 external hard drive that isn't loading properly to my desktop, which is running Windows XP Home Edition SP2, an AMD Athlon XP 1600+ with a VIA chipset, and more than 1GB of RAM.

My older Maxtor 3000LS 40GB drive works perfectly. I know the Maxtor OneTouch 4 is OK because it works with my Toshiba Satellite laptop with Windows XP.

When I plug the OneTouch 4 into my desktop, I get a yellow question mark in the Device Manager for Other Devices, which suggests that Windows recognizes the drive on some level. However, I still get a Code 28 message that says drivers for this device are not installed. What can I do (without reinstalling Windows, updates, or other programs) to load the proper drivers? Is there anything in the registry that might be added or deleted to make this work?

—Len Kane

The OneTouch 4 should just pop up and work as normal in Windows XP since the drivers for the external storage device are written on the device itself. You don't have any discs or downloads to turn to.

The Doc suspects the drive itself is working just fine. After all, if it didn't, you wouldn't be able to pull it up on any machine, period. To find an answer to your dilemma, the Doctor hit up Seagate for assistance.

The company suggests that you reset Windows's Infcache.1 file. To do this, launch Windows Explorer and type `C:\windows\inf` in the Explorer bar. Press Enter, which will pull up the inf folder. Search for the Infcache.1 file and delete it. Unplug your OneTouch 4 and restart your computer. When Windows boots again, the operating system will have rebuilt the Infcache.1 file. Seagate says this should fix the problem that's causing Windows to issue a Code 28 message when you plug in the drive.

If it doesn't, you have one alternative: Run a repair/restore installation of Windows XP since something is probably mucking up your USB drivers.

Sharing Data

Do CPU-intensive programs perform better on a drive that's physically separate from the OS drive, especially if the drives do not share the same data cable? In other words, the OS is on a SATA drive and the hard-hitting program is on an IDE drive, for example. Where does the page file come into this? Should it be placed on a third drive?

—Timothy Joyce

If the application is truly 100-percent CPU-bound, you are unlikely to see an impact by moving the output to a second or third drive. For example, encoding a two-pass H.264 video is almost entirely processor driven and produces very small disk writes and reads. But if you are editing a large Adobe Photoshop file that is caching to the hard drive, having Photoshop write to a secondary or tertiary drive will actually help performance. In that scenario, your performance is gated by the CPU and somewhat by the drive you are writing to.

You can always try putting the Windows page file on a separate drive, but you're probably better off adding more RAM—unless, of course, the original drive is a complete loser; then you might see a small performance boost, but nothing extraordinary.

HP's Blackbird 002 machine is one rig that can run CrossFire AMD cards on an nForce-based motherboard, thanks to custom drivers.

CrossFire and nForce?

My latest rig has a Gigabyte GA-M59SLI-S5 motherboard, and I'm using an ATI Radeon 1950XTX. I had an Nvidia 7950 GX2 originally and was going to use it in an SLI configuration down the road. That card ended up being a real pain, so I exchanged it for the ATI. Can I add a second ATI card and run CrossFire since the cards would be sitting in an Nvidia-chipset mobo made for SLI? I've found conflicting info on the subject and don't want to spend the money on a second card if it won't work.

—Greg Bauman

There's no good reason you can't run two AMD videocards

in CrossFire on an SLI motherboard, but there is a political reason—and as usual, politics trumps fairness. HP's Blackbird PC allows two AMD cards to run in CrossFire mode on an SLI motherboard, but AMD has no plans to release the drivers that support this to the public. Still, AMD is making special drivers for Hewlett-Packard, Dell, and Alienware that will allow the companies to run CrossFireX cards on nForce SLI boards. AMD says it will only do so because those OEMs can ensure that the drivers work properly on nForce motherboards.

HDCP Woes

I built a PC about a year ago, and now I'd like to add a Blu-ray drive so I can watch movies on it. I think I am screwed by HDCP. Is there a workaround available that will let me watch HD movies without having to buy a new graphics card and monitor? I am using DVI connections, but I understand that this is not the same as HDCP, despite both products being advertised as HD-compatible. My videocard is a Gigabyte GeForce 7600 GS (256MB) and my monitor is an Acer AL2423W.

—Wade Tanev

Your Gigabyte card is indeed "HD compatible," but that doesn't mean it will play copy-protected Blu-ray movies because, as you've guessed, it's not HDCP compatible. The same goes for your monitor. HDCP is a digital-rights-management scheme that requires a digital handshake at every stage of playback, from the disc to the videocard, and from the videocard to the display. Fortunately, there's an easy fix. It's not free, but it's much cheaper than replacing your videocard and your display. Buy SlySoft's AnyDVD (49 euros) and AnyDVD HD Option (30 euros). Install this software on your PC and you'll be able to play back any copy-protected DVD or Blu-ray disc without an HDCP-compatible videocard or display.

You should be aware, however, that decoding Blu-ray video is extremely processor intensive. Your 7600 GS will rely on the host CPU for much of this decoding effort (CPU utilization could range as high as 100 percent). Newer GPUs from both AMD (beginning with the RV670 series) and Nvidia (beginning with the G92 series) are capable of offloading the entire decode process from the host CPU.

I THINK I AM SCREWED BY HDCP. IS THERE A WORKAROUND AVAILABLE THAT WILL LET ME WATCH HD MOVIES?

Freeing up the DVR

I've got a Comcast DVR (Motorola DCT 6412) that's chock-full of content I want to watch, but the hard drive is filling up faster than I can watch the programming. The cable box has a number of connectors, including FireWire, Ethernet, and USB. I've heard rumors that there's a way to download content off of the hard drive in the box but have not been able to get it to work on my Windows XP laptop (a Dell E1705). Any ideas?

Are there any legal issues involved? Lastly, there's a lot of HD content on the DVR, but my laptop doesn't have an HD writer. Can something be done to make the HD content work when played on a laptop, or is it just too much bandwidth for the technology I've got?

—Michael Collins

The Doctor knows you can plug a USB hard drive into a Dish Network DVR, but he doesn't think Comcast has ever activated the USB ports (or the FireWire or Ethernet ports either, for that matter) on its set-top boxes. The Ethernet port on the Dish boxes is active, but only for downloading on-demand movies over the customer's network via broadband (you can't transfer files to a PC over the network).

So, in short, your content is locked to your Comcast box. If you want to expand your ability to transfer TV programming, you should look to another service, such as TiVo.

You can have all the right connectors yet still no high-def signal going between your computer and your monitor. Thanks, copy protection.

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

REVIEWS

Tested. Reviewed. Verdictized

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- ZVOX AUDIO ZVOX 425 SPEAKERS
- SAMSUNG ACE
- CORSAIR SURVIVOR 32GB FLASH DRIVE
- OCZ 32GB ATV FLASH DRIVE
- HP 2133 MINI-NOTE

PLUS **Best of the Best, Editors' Blogs, and the No BS Podcast**

LAB NOTES

Cheaper, My Ass!

Forget gold, old PC parts are the hot investment

GORDON MAH UNG
SENIOR EDITOR

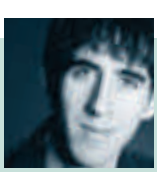
We're always told that old technology is worthless, but my experience with this month's upgrade story tells me otherwise. I naturally assumed that I'd find parts that were a year or two old in the bargain bin and thus be able to make more aggressive upgrades. Instead, I found that a two-year-old GeForce 7900 GTX will set you back $300—while a new 9800 GTX costs just $340. Huh? How about $200 for a 3.4GHz Socket 478 Pentium 4? Or $360 for a Socket 939 2.6GHz Opteron 185?

What the hell? These aren't classic 1966 Shelby Mustangs, people—they're computer parts. *Old* computer parts. Why are prices so high? Part of it is due to dwindling supply. Once the fabs turn off, they'll never turn on again. That's what causes DDR to cost 100 percent more than DDR2. Whatever the reason, all I know is that maybe it's time to start socking away my old PC parts with my mint *Star Wars* cards and action figures.

Would you pay $300 for a 7900 GTX?

WILL SMITH
EDITOR-IN-CHIEF

This month, most of my time has been spent working on a secret project, which I'll be able to talk about more next month. In my free time, I've been perfecting my movie-ripping technique, making the switch from Xvid to H.264 using Handbrake. I love that DVD-quality video!



DAVID MURPHY
ASSOCIATE EDITOR

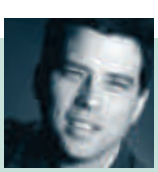
I broke the plastic locking tab on the end of a network cord, and boy, does that suck. Pushing the connector all the way into my mobo's Ethernet port does nothing, so I spent most of my month wiggling the cord in and out just to get on the Interweb.

KATHERINE STEVENSON
DEPUTY EDITOR

I've never been a huge fan of fancy LED lights in computers, but that changed once I started messing around with the AlienFX lighting in Alienware's m15x notebook (see page 80). I spent so much time changing the colors of the rig's various LEDs that I was late turning in the review.

MICHAEL BROWN
EXECUTIVE EDITOR

Look online for my reviews of the Slacker Radio Player and the Ibiza Rhapsody. The Slacker is like carrying Last.fm or Pandora in your pocket. The Ibiza Rhapsody explains why Rhapsody didn't reach out to Sansa Connect owners who got burned by the demise of Yahoo Music.



TOM EDWARDS
MANAGING EDITOR

For the last few weeks I've been walking around with 5,000 songs and an album full of photos in my pocket—testing the latest high-capacity flash drives from a number of manufacturers. To find out who makes the best pocket-size storage device, check out my reviews at MaximumPC.com.

Gigabyte GeForce 9800 GX2

More beast than beauty

Compared to AMD's gracefully engineered Radeon 3870 X2, Nvidia's GeForce 9800 GX2 (represented here by Gigabyte's implementation) is something of a kludge. But when we consider the performance that Nvidia's design delivers, it's hard to complain about elegance.

Both AMD's and Nvidia's solutions deliver dual-GPU performance from a single PCI Express slot without requiring chipset support (and in both cases, adding chipset support allows you to run *four* GPUs in one system). AMD's solution, however, plants two Radeon 3870 GPUs and two 512MB frame buffers on a single printed circuit board; Nvidia's design entails taking two PCBs (each with a G92 processor and 512MB of GDDR3 memory), bolting them together, and sticking a ribbon cable in between. It's a quick-and-dirty brute-force solution, but it delivers frame rates like nobody's business.

Gigabyte hewed closely to Nvidia's reference design, clocking the GPU cores at 600MHz, the shaders at 1.5GHz, and the memory at 1GHz. Pay no attention to what Nvidia's website says, the chip's memory interface is 256 bits wide, not 512. It seems both Nvidia and AMD have realized that wider interfaces weren't delivering as much performance as they had anticipated; these days, 256-bit memory interfaces are de rigueur even at the high end.

We've given up benchmarking Crysis at 1920x1200, and no card has yet delivered what we'd call acceptable performance even with the 1280x720, 2x AA settings we've been using—until now: The 9800 GX2 pumped out 41.4 frames per second.

Maximum PC readers don't live by games alone, and you obviously don't need two G92s to watch a Blu-ray movie, but we're happy to report that the 9800 GX2 includes Nvidia's excellent PureVideoHD for offloading high-definition video decoding from the host CPU. The HDMI socket on the mounting bracket saves you from having to use an adapter, but getting digital audio to that connector involves another kludge: a cable from your motherboard header to a socket on the card (AMD's solution routes digital audio over the bus).

But if we can't have both, we'll take beast over beauty any day of the week. —MICHAEL BROWN

BENCHMARKS

	GIGABYTE GEFORCE 9800 GX2	MSI RADEON 3870 X2
Windows XP		
3DMark06 Game 1 (FPS)	**51.2**	48.0
3DMark06 Game 2 (FPS)	41.0	**42.3**
Crysis (DX9) (FPS)	**41.4**	22.6
Unreal Tournament 3 (FPS)	**108.8**	90.4

Best scores are bolded. AMD-based cards tested with an Intel D975BX2 motherboard; Nvidia-based cards tested with an EVGA 680i SLI motherboard. Intel 2.93GHz Core 2 Extreme X6800 CPUs and 2GB of Corsair DDR RAM used in both scenarios. Benchmarks performed on ViewSonic VP2330wb monitors. For Vista results, see http://tinyurl.com/3ss7s2.

MAXIMUM PC KICK ASS!

VERDICT **9**

GIGABYTE GEFORCE 9800 GX2

+ BRUTE FORCE	− BRUT COLOGNE
Great for gaming. HDMI on the mounting bracket.	Kinda kludgy—especially the audio cable for the HDMI port.

$600, www.gigabyte.us.com

The 9800 GX2 supports HybridPower, so if you're using a Hybrid SLI mobo (a Socket AM2+ model with an nForce 720a or nForce 730a chipset), you can save power while running less-demanding applications by shutting down both its GPUs and using integrated graphics.

Alienware Area-51 m15x

Peak performance if you want to pony up the cash

It's easy to be seduced by Alienware's m15x notebook. From its handsome silver-gray case to its cool-yet-tasteful LED accents to its comfortable lap weight of less than eight pounds, this 15.4-inch machine had us at hello. Of course, only excellent performance would keep us interested.

Our hopes were high. The m15x came to us sporting Intel's new 2.8GHz Core 2 Extreme X9000 mobile CPU and Nvidia's GeForce 8800M GTX videocard. Those are the highest performing mobile parts in their respective categories—a caliber typically reserved for larger, heavier 17-inch models.

For comparison's sake, we turned to the Asus C90S notebook we reviewed in October 2007, rerunning all of our notebook benchmarks on Vista. The C90S is unique in that it uses Intel's Core 2 Duo E6700 desktop CPU. Clocked at 2.66GHz on a 1,066MHz front-side bus, the E6700 seemed like a worthy competitor to the X9000 mobile part, which has a modest 140GHz clock-speed advantage but a slower 800MHz front-side bus.

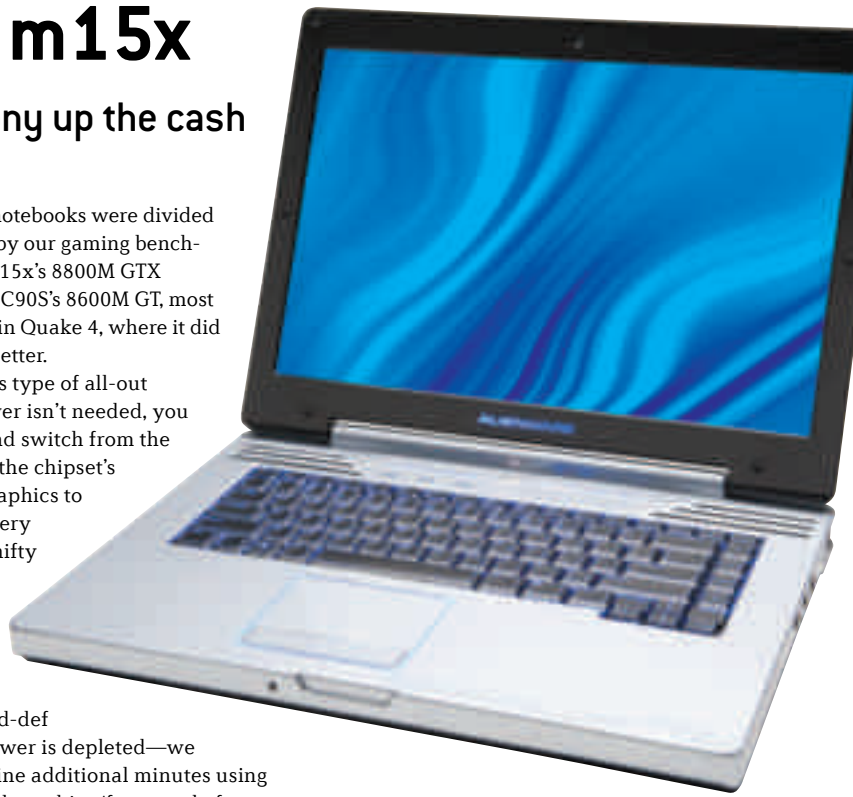
Turns out, however, the fight wasn't really all that fair. The X9000 part has the benefit of Intel's 45nm Penryn core, as well as 6MB of L2 cache (compared with the 4MB found in the E6700), and apparently that makes all the difference. In our CPU-dependent benchmarks, the m15x performed 11 percent to 31 percent faster than the C90S.

The two notebooks were divided even further by our gaming benchmarks. The m15x's 8800M GTX walloped the C90S's 8600M GT, most dramatically in Quake 4, where it did 178 percent better.

When this type of all-out graphics power isn't needed, you can reboot and switch from the videocard to the chipset's integrated graphics to preserve battery power. It's a nifty idea, but in our own battery rundown test—playing a standard-def DVD until power is depleted—we gained just nine additional minutes using the integrated graphics (for a total of one hour and 35 minutes). The m15x also offers a Stealth mode, which lets you throttle back the CPU and GPU for power savings and quieter operation.

The m15x came to us with a 200GB 7,200rpm hard drive and a Blu-ray burner, but the latter can be easily popped out of its Smart Bay and hot-swapped with an optional 320GB 5,400rpm secondary drive ($300) or secondary battery ($150).

In another nod to customization, a software Command Center lets you change the colors of the m15x's various LED lights, making the power button glow red, for instance, while the keyboard backlighting glows green and the illuminated piping around the notebook's lid glows blue. A row of touch-sensitive buttons above the keyboard contributes to the m15x's light show, but while they look cool, they're not especially reliable—we sometimes had to press them several times to get a response.



The m15x's 15.4-inch formfactor belies the powerful parts inside.

We have no complaints, however, about the m15x's 1920x1200 screen, which offers a 1920x1080 option for use with high-def content. Available ports consist of three USB ports, a FireWire port, HDMI, Ethernet, and mic. Sadly, no eSATA.

In the end, our infatuation with the m15x remains strong. It's as powerful as any 17-inch notebook out there and much easier to carry around. And it looks good, to boot. Consider us sold—even if the price does break us. —KATHERINE STEVENSON

SPECIFICATIONS

CPU	Intel 2.8GHz Core 2 Extreme X9000
RAM	4GB DDR2 /667
HardDrive	Hitachi 200GB 7,200rpm
Videocard	Nvidia GeForce 8800M GTX
Soundcard	RealTek HD Audio
Boot/Down	56 sec/36 sec
Lap/Carry	7lb 15oz/9lb 8oz

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3	1,860 sec	1,680 (11%)
Photoshop CS3	237 sec	188 (26%)
Proshow	2,416 sec	1,840 (31%)
MainConcept	3,498 sec	3,036 (15%)
FEAR 1.07	21 fps	29 (38%)
Quake 4	26 fps	72 (+172%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current notebook test bed consists of a 2.4GHz Core 2 Duo E6700, 2GB of Patriot DDR/667 RAM, a GeForce Go 8600M GT videocard, a Seagate 80GB SATA hard drive, and onboard RealTek HD Audio.

MAXIMUM PC KICK ASS!

VERDICT 9

ALIENWARE AREA-51 M15X

+ ET	− DT
Portable size, powerful parts, and a stylish aesthetic.	Expensive, gimmicky touch buttons, and no eSATA.

$4,370, www.alienware.com

Dell Ultrasharp 3008WFP

This 30-inch display falls a bit short of its target

If your videocard doesn't support the 3008WFP's DisplayPort connector, VGA, DVI-D, and HDMI inputs are also options.

Dell's latest jumbo Ultrasharp LCD, the 3008WFP (with a native res of 2560x1600), performs exactly as the company's marketing materials promise. This monitor truly "produces darker blacks." In fact, we think Dell's underselling the device—the 3008WFP takes the dark spectrum and covers it with the equivalent of a dark sheet. Even at the monitor's maximum brightness we found ourselves unable to see distinctions at the low end of DisplayMate's grayscales.

The situation isn't much better on the light end of the spectrum: The 3008WFP suffers from a compressed color range. While the 3008WFP's white is bright and dramatic, it spills over into the light grays, blowing out image detail in our artificial and real-world tests. If we lower the brightness, the dark end of the grayscale worsens. And that's when we're using the monitor's sRGB preset. Other modes, such as the Desktop preset, distort the monitor's clarity and add color to grayscale gradients.

That said, the monitor's Multimedia preset did accomplish wonders in our HD DVD test—details in the dark bits of the movie matched what our current favorite 30-inch monitor, Gateway's XHD3000, produced. However, the setting also made colors appear overly saturated.

Our other real-world tests, including high-quality picture viewing and romps through BioShock, produced similar results. But there was one instance in which the 300WFP's grayscale issues couldn't be resolved by any presets. A high-res digital image with shadows that produce a sweeping black-to-white gradient was clearly marred by banding and other artifacts. A very specific example, yes, but something serious photogs and designers should note.

In gaming, the 3008WFP is equal to other high-performance LCDs we've tested. We also like the 3008WFP's adjustable stand, its five built-in USB ports, and its built-in media reader. The 3008WFP is also the first DisplayPort monitor we've ever tested. Too bad our high-end videocards don't yet support the Dual Link DVI–destroying technology. **–DAVID MURPHY**

VERDICT 7

DELL ULTRASHARP 3008WFP

+ LANCER	– PRUNER
Crystal-clear whites; acceptable overall picture quality.	Compressed grayscale; presets lead to color oversaturation.

$2,000, www.dell.com

Logitech Squeezebox Duet

Lots of changes to one of our favorite streamers—all good!

The Squeezebox Duet receiver has a low profile, with just one multicolored LED to inform you of the device's status.

When you see a color display on a music-streamer's remote control, it's natural to assume that the manufacturer is going after the vaunted Sonos Digital Music System. But after thoroughly testing the Squeezebox Duet—Slim Devices's first new product since being acquired by Logitech—we've concluded that Sonos has little to worry about.

But the Squeezebox Duet isn't a failure—in fact, it's the best Squeezebox yet—but it's aimed at an entirely different audience than the Sonos. Where the Sonos is closed, proprietary, and relatively static, the Squeezebox operates on open-source software that encourages tinkering, third-party development, and evolution. You'll find a host of plugins for the SlimServer software (now called SqueezeCenter) that all Squeezeboxes run on, and if you can't find one for your task, you can roll your own.

But sound is the most important criterion for measuring an audio streamer's performance, and the Duet's design forced Logitech to drop the 24-bit Burr-Brown DAC that lent previous Squeezebox models their sweet disposition. We're happy to report, however, that the 24-bit Wolfson WM8501 DAC that replaced it is very much its equal. Rather use outboard gear? The Duet is outfitted with optical and coaxial digital outputs, as well as analog stereo. The device supports every important file format, including AIFF, FLAC, MP3, OGG VORBIS, WMA, and WAV natively; and AAC, APE, Apple Lossless, MPC, and WMA Lossless transcoded.

The new Squeezebox receiver is smaller than the Squeezebox 2 and can be tucked away in your entertainment center—just make sure it can reach your wireless access point. The receiver is equipped with a 10/100 Ethernet port, but in the ideal installation, the remote will communicate with the receiver (and control other Squeezeboxes) over your 802.11b/g Wi-Fi network. In the absence of a wireless network, the remote will establish a wireless connection with the closest receiver, but your range will be limited because the devices will operate in ad hoc (as opposed to infrastructure) mode.

The Squeezebox controller displays album art, artist and song information, playlists, and other information on its 2.4-inch backlit LCD (the buttons are backlit, too). The remote is easy to master: A mechanical scroll wheel lets you move up and down through lists, and you press the center button to open menus or select items. Four buttons arranged around the perimeter of the wheel let you add songs to your playlist, play a selection, move back through menus, and move to the top-level menu, respectively. The remaining five buttons control volume up/down, track forward/back, and pause. The controller isn't nearly as elegant as what Sonos has to offer, but it's a huge leap forward from previous Squeezebox remotes.

The Sonos Digital Music System remains the product to beat in terms of elegance and effortless setup, especially for multi-room configurations, but Sonos can't touch the Squeezebox's programmability and sheer flexibility. The Squeezebox Duet is much cheaper, too. —MICHAEL BROWN

MAXIMUM PC KICK ASS!

VERDICT 9

LOGITECH SQUEEZEBOX DUET

+ SQUEEZE	− THROTTLE
Terrific remote control, inexpensive, open source.	Piggybacks on your Wi-Fi network, compatible only with 802.11b/g.

$400, www.logitech.com

SPECIFICATIONS

Audio File Formats	AIFF. FLAC, MP3, OGG VORBIS, WMA, WAV (native) AAC, APE, Apple Lossless, MPC, WMA Lossless (transcoded)
Networking	10/100 Mb/sec Ethernet; 802.11b/g
Display	2.4-inch LCD in remote control
Digital to Analog Converter	24-bit Wolfson WM8501 (24-bit resolution, 192kHz sampling rate)
Audio Outputs	RCA, S/PDIF, Toslink

CoolIT Freezone Elite

Powerful performance makes tricky installation tolerable

Hands down, CoolIT's chilled-water Peltier coolers provide the best way to cool your CPU. However, as the technology for these coolers has advanced, so has their complexity and size.

Like CoolIT's Eliminator Peltier device (reviewed April 2007), the Freezone Elite sports six thermoelectric coolers (TECs), which transfer heat from the coolant to the device's 12.1cm-long heatsink. But the Elite rocks a 12cm fan rather than the Eliminator's 9.2cm air pusher, and instead of a three-setting toggle switch to control fan speed and TEC power, the Elite comes with CoolIT's MTEC Control Center, which lets you control the device via the operating system.

Controlling the cooler is as easy as installing the included software and setting a temperature for the coolant: The program adjusts the cooler's fan speed and TEC power to attain the desired temperature. This keeps the fan from having to be set at full bore (and saves our hearing in the process—at full speed, this fan brings the noise). But that's just the beginner mode. Enthusiasts can set minimum and maximum power points to ensure certain levels of performance independent of what is established as the coolant temperature. It's especially helpful if you're obsessed with either cold temperatures or quiet operation.

Installing the cooler requires motherboard removal—and a bit of luck, since the Elite rests perilously close to critical components. We were worried that the device's entanglement of tubing and power cords wouldn't fit above our CPU. And our fears persisted when we had trouble connecting the fan and power cords to the cooler's MTEC box. We had to bend the prongs of the MTEC's fan connectors to achieve a lock-solid connection.

If only CoolIT enclosed the cooler's parts—the jumble of wiring, tubes, and control boxes lacks a power-user look.

The payoff, however, is exceptional cooling. When we ran the Elite at its bare power minimums, it chilled our CPU like a quiet stock cooler. But cranking the Elite's settings to full blast destroys the competition—save for CoolIT's very own 12-TEC Boreas cooler. The Elite's cooling prowess comes with a steep price and a bit of a tricky installation, but it's easily the most practical of the super-chilling CPU coolers. —DAVID MURPHY

VERDICT 8

COOLIT FREEZONE ELITE

+ BRUTES	− ELITES
Powerful cooling and control, thanks to the MTEC software.	Not the easiest cooler to install. Expensive!

$450, www.coolitsystems.com

BENCHMARKS

	CoolIT Freezone Elite (low)	CoolIT Freezone Elite (high)	Zalman CNPS9700	Stock Cooler
Idle (C)	38.0	**14.0**	31.0	39.0
100% Burn (C)	68.0	**32.0**	48.0	67.0

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard.

Assassin's Creed

All hail the honorable hit man

Even eight-on-one fights aren't dire if you perfectly time your counterattacks.

The death-defying urban acrobatics of free running—seen recently on the big screen in the *Casino Royale* remake, *The Bourne Ultimatum*, and *Live Free or Die Hard*—are replicated to great effect in Assassin's Creed, an action-adventure console port that puts you in the nimble shoes of a 12th-century assassin. Light feet and tremendous upper-body strength, rather than overwhelming firepower, are your greatest assets as you scale walls and barrel across rooftops in one of the most refreshing games we've played.

As the assassin Altair, you are charged with executing nine high-profile targets spread across three Middle Eastern metropolises. Hunting down these ruthless slave traders and hedonistic rulers is no easy task—you must first complete a series of mini-quests to acquire information about your target. Eavesdropping and pick-pocketing missions test your patience and ability to blend into dense crowds, while eliminating tower guards and racing across rooftops challenge your ability to vault across the tops of cities with finesse.

We were entranced by the free-running aspect of the game and spent hours exploring the highly detailed open world. Climbing the tallest peaks of each city let us survey breathtaking vistas—gorgeous visuals justify the game's high system requirements. Mouse and keyboard control let us deftly navigate the world with ease, but we found the gamepad to be more intuitive when complicated sword fighting was required. The story—an unraveling conspiracy—featured enough twists to keep us interested but became secondary to the unrelenting action.

It's not often that we come across a game that not only introduces revolutionary gameplay mechanics but does so without compromising a sense of fun. Assassin's Creed does for action-platformers what Grand Theft Auto III did for driving games—infuses a wondrous sense of exploration and open-endedness into the genre. We can't help but admire its ambitious design and adore its killer execution. **–NORMAN CHAN**

ASSASSIN'S CREED

VERDICT 9

+ FREE RUN	– FACE PLANT
The massive open world is a joy to explore.	Side missions repetitive. High system requirements.

$50, www.assassinscreed.com, ESRB: M

Win Rig of the Month

If chosen, your rig will be featured before all the world in Maximum PC—and you'll win a $250 gift certificate

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to **rig@maximumpc.com.** Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) the contest ends, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod s likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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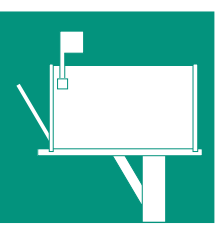

Book Smarts

I just finished reading "Bookin' to the Future" in the May 2008 issue (Quick Start), and I can't believe you didn't mention Baen publishing.

- It has more than 40 authors with free books online. Eric Flint alone has more than 25 books available for free download. All the books are offered in multiple formats, including RTF, and all are DRM-free.
- All its books, free and for sale alike, are DRM-free.
- It offers many of its books as advanced reader copies. I love reading the latest Weber, Ringo, or Flint before the book is even available in hard copy.
- It offers a WebScriptions plan in which subscribers receive their books in serialized form.

Of all the book publishing companies "embracing the Internet as a necessary component of doing business in the digital age," I think that Baen is in the forefront.

—Ron Critchfield

Deputy Editor Katherine Stevenson Responds: Thanks for your letter, Ron. We weren't familiar with Baen, but from what you've said, it sounds like the company is indeed a model of how traditional print publishers can leverage the Internet to build a larger customer base. Fans of science fiction and fantasy lit should check out Baen's website (www.baen.com) for more details.

Rethinking the 56k Connection

I saw this snippet about the Internet outage in the Middle East (Quick Start, April 2008) and how it affected people in that region getting their YouTube. Not to nitpick, but while our military networks were untouched, that cable being damaged greatly impacted our ability to email home, as our network's bandwidth dropped tremendously. We were almost completely cut off from online banking and many of the other things that most people take for granted—but that we need access to so we can function over here. I never thought I'd say it, but sometimes being over here makes me miss 56k.

—SPC Louie Clark
US Army

Editor in Chief Will Smith Responds: We shouldn't have made light of the outage, Louie; losing Internet access is no laughing matter, especially when you're so far away from home. I know that I get a little stir-crazy when my cable connection goes down for even a few hours. I can't imagine how an outage on the scale experienced in the Middle East affected you and others in the region.

Downgrading to XP

Your response to the "Gateway to XP" question in the April issue was somewhat incorrect. The assumption that Vista shouldn't

PHOTO OF THE MONTH

Your Photo Here?

No, we don't want pictures of you personally. Rather, You should be like a ninja, slyly and stealthily capturing images of tech life, be it an outrageous PC, an unbelievably silly gadget, a scene of horrific hardware destruction, or an animal posed with any or all of the above. Each month we'll choose our favorite and feature it right here.

To enter, send your tech-related, high-res digital photo to comments@maximumpc.com.

or can't be downgraded to XP on a laptop is what the manufacturers want us to believe. I encountered the same issue when I tried to downgrade my HP laptop from Vista Home Basic to XP. HP stated on its website that this *cannot* be done and should never be attempted.

I surmised that PC or laptop hardware is not Vista specific. Hardware is hardware and the XP drivers needed to run a machine can be found on any hardware manufacturer's website. Even if you don't know what brand of hardware your laptop has (without cracking it open), Windows XP can still find drivers for it via the web or you can download them from the setup disk (if supplied) that came with the unit. I was able to successfully downgrade my laptop to XP.

In my opinion, manufacturers like HP and Gateway are either being bullied by Microsoft to exclude support for downgrading the OS or they just don't want to be bothered by their customers. In any case, it's a shame that they deliberately cover up valuable information for those who desire to get rid of rubbish, meaning Vista.

—Steve Cox

Senior Editor Gordon Mah Ung Responds: I think you actually missed the point of the original reader's question. I believe the reader was looking for a solution from Gateway, as in a disc that he could trade for his Vista disc, so he could install XP. Sure, he could install Windows XP on his new notebook, but he would have to pay for a copy of Windows XP after having paid for the copy of Vista that was on the notebook. If you ask me, that's bunk, which is why we recommend that you purchase a notebook with XP preinstalled.

NOT TO NITPICK, BUT... THAT CABLE BEING DAMAGED GREATLY IMPACTED OUR ABILITY TO EMAIL HOME....

The No BS Podcast Now on Zune

Hello, from what I see, you host the No BS Podcast through iTunes. Is there any way I could get your podcasts directly sent to my Zune software? Or is the only option now to download and export using iTunes, convert it to Zune format, then send it to my Zune? This would be a great addition if you could have an RSS that was compatible with Zune.

—Brendan Gaulin

Executive Editor Michael Brown Responds: This was an oversight on our part—we never submitted our podcast to the Zune Marketplace. But we have now, thanks to your question. Assuming Microsoft doesn't have a problem with our podcast, you should be able to find it in the Zune Marketplace podcast listing by the time you receive this issue. Happy listening!

Giving Nero the Nod

In your "Roxio vs. Nero" feature (April 2008), you note that one of Nero's shortcomings is its use of the MP4 standard (as opposed to DivX or Xvid), which you could not get to work on an Xbox 360. That is correct. However, if you use the Nero AVC format—that is Nero's name for H.264—you should have no problems. I encode movies using the Cinema AVC format all the time and they play perfectly well on my Xbox 360. One area of aggravation is that I have to run the Microsoft Zune software on one of my systems to handle the indexing so the Xbox can see it, but it works fine. As it is a standard H.264 file, I am also able to get it to play on my Mac computers.

—Jim Barrett

Editor in Chief Will Smith Responds: I have to claim full responsibility for this mistake. Katherine Stevenson enlisted my help to test Xbox streaming for the story and I blithely dumped the Nero-encoded files into the directory that Media Player 11 automatically shares to my Xbox, without knowing that Media Player doesn't actually know it can stream the AVC codec. Since then, I've streamed the Nero test rip using both the Zune software and TVersity (see our TVersity how-to at www.maximumpc.com/article/streaming).

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN
MAXIMUM PC'S
NOW WITH INK ACCELERATION*
JULY ISSUE

1 HARDWARE HACKS
We'll show you 13 ways to modify your PC parts for added power and usefulness.

2 MOTHERBOARDS
Our roundup of motherboards using the latest and greatest performance chipsets from Intel, Nvidia, and AMD will help you choose your next board!

3 BUDGET ENCLOSURES
Is it necessary to spend big bucks on a PC case? We'll test several sub-$100 boxes to find out.

4 DEATHMATCH
How do the latest midrange videocards from AMD and Nvidia compare? You'll know next month.

** 10.1-compliant ink-accelerator hardware required*

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DEVILISH

Project13

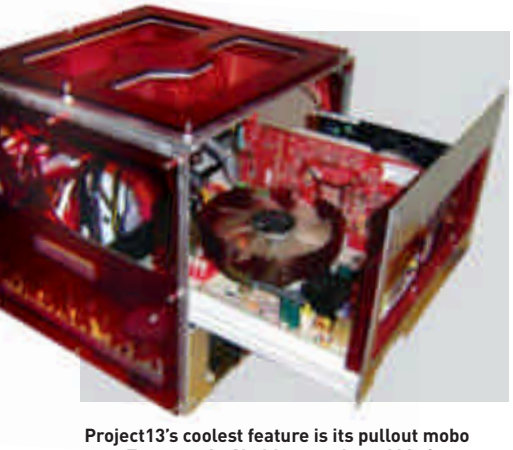
Sheldon Bright loves going to LAN parties, but dragging around a full-size rig can be a hassle. So he decided to design and build a compact but powerful machine that he could easily transport—and that would garner a lot of attention.

One necessity was that the rig had to fit a full-size ATX board, and after fiddling with the design, Sheldon discovered that a 13-inch cube provided a perfect combination of space for components and portability. He then carried throughout the design of the case the idea that 13 is an unlucky number.

CONGRATULATIONS

For submitting this month's winning entry, Sheldon has won a $250 gift certificate. To enter the Rig of the Month contest, see the official rules on page 92.

The details on the sides of the rig include a row of flames, the number 13, a pentagram, and a devilish lass.



Project13's coolest feature is its pullout mobo tray. To create it, Sheldon purchased kitchen-drawer side rails from the hardware store and affixed them to the sides of the case.

Red transparent Plexiglas, red anodized paint and red LEDs: When this rig is powered up it glows like a Cylon helmet!

While built to hit the road, Project13 also looks great when set up in a home environment.

MAXIMUM PC (ISSN 1522-4279) is published monthly by Future US, Inc, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080, USA. Periodicals postage paid in South San Francisco, CA, and at additional mailing offices. Newsstand distribution is handled by Time Warner Retail. Basic subscription rates: one year (13 issues) US: $20; Canada: $26; Foreign: $42. Basic subscription rates "Deluxe" version (w/CD): one year (13 issues/13 CD-ROMs) U.S.: $30; Canada: $40; Foreign $56. US funds only. Canadian price includes postage and GST (GST#R128220688). Postmaster: Send changes of address to Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659. Standard Mail enclosed in the following edition: B1, C1, C2, C3, C4. Ride-Along enclosed in the following editions: D1, D2, D3, D4. Int'l Pub Mail# 0781029. Canada Post Publications Mail Agreement #40043631. Returns: Bleuchip International, P.O. Box 25542 London, ON N6C 6B2. For customer service, write Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659; Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Future Network USA also publishes Mac|Life, PC Gamer, Official Xbox Magazine, PlayStation: The Official Magazine, Nintendo Power, Guitar World, Revolver, Future Snowboarding, Snowboard Trade News & Pregnancy. Entire contents copyright 2008, Future Network USA. All rights reserved. Reproduction in whole or in part is prohibited. Future Network USA is not affiliated with the companies or products covered in Maximum PC. PRODUCED AND PRINTED IN THE UNITED STATES OF AMERICA.

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